

DOSEMI

SiC MOSFET

DM88C12T6

1200V/8.86 mΩ Mosfet without Diode

General Description

DOSEMI MOSFET Power Discrete provides ultra low conduction loss as well as low switching loss. They are designed for the applications such as hybrid and electric vehicle.

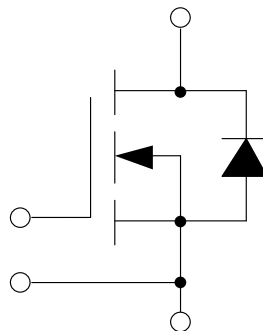
Features

- SiC power MOSFET
- Low $R_{DS(on)}$
- Chip sintering technology
- Low inductance case avoid oscillations
- Isolated heatsink using Si_3N_4 AMB technology
- ROHS

Typical Applications

- Automotive application
- Hybrid and electric vehicle
- Inverter for motor drive

Equivalent Circuit Schematic



Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted**Mosfet**

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSSmax}	Gate-Source Voltage	-8/+19	V
V_{GSSop}	Gate-Source Voltage	-4/+15	V
I_D	Drain Current @ $T_C=95^{\circ}\text{C}$	200	A
I_{DM}	Pulsed Drain Current	TBD	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	1293	W

Body Diode

Symbol	Description	Value	Unit
I_F	Source Current @ $T_C=95^{\circ}\text{C}$	150	A

Discrete

Symbol	Description	Values	Unit
T_{jop}	Operating Junction Temperature	-40 to +175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
T_S	Soldering Temperature, 1.6mm from case for 10s	260	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	2500	V

Mosfet Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=146\text{A}, V_{GS}=15\text{V}, T_j=25^{\circ}\text{C}$		8.86		$\text{m}\Omega$
		$I_D=146\text{A}, V_{GS}=15\text{V}, T_j=150^{\circ}\text{C}$		11.4		
		$I_D=146\text{A}, V_{GS}=15\text{V}, T_j=175^{\circ}\text{C}$		14.7		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=45.4\text{mA}, V_{DS}=V_{GS}, T_j=25^{\circ}\text{C}$	1.7	2.4	3.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_j=25^{\circ}\text{C}$			64	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0\text{V}, T_j=25^{\circ}\text{C}$			500	nA
R_{Gint}	Internal Gate Resistance			2.05		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=1000\text{V}, f=100\text{kHz}$		12.8		nF
C_{oss}	Output Capacitance			0.46		nF
C_{rss}	Reverse Transfer Capacitance			0.04		nF
Q_g	Total Gate Charge	$I_D=146\text{A}, V_{DS}=800\text{V}, V_{GS}=-4/+15\text{V}$		439		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=200\text{A}, R_G=2.4\Omega, L_S=40\text{nH}, V_{GS}=-4/+15\text{V}, T_j=25^{\circ}\text{C}$		34		ns
t_r	Rise Time			88		ns
$t_{d(off)}$	Turn-Off Delay Time			138		ns
t_f	Fall Time			84		ns
E_{on}	Turn-On Switching Loss			15.2		mJ
E_{off}	Turn-Off Switching Loss			5.51		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=200\text{A}, R_G=2.4\Omega, L_S=40\text{nH}, V_{GS}=-4/+15\text{V}, T_j=150^{\circ}\text{C}$		33		ns
t_r	Rise Time			78		ns
$t_{d(off)}$	Turn-Off Delay Time			164		ns
t_f	Fall Time			86		ns
E_{on}	Turn-On Switching Loss			16.7		mJ
E_{off}	Turn-Off Switching Loss			6.11		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=200\text{A}, R_G=2.4\Omega, L_S=40\text{nH}, V_{GS}=-4/+15\text{V}, T_j=175^{\circ}\text{C}$		31		ns
t_r	Rise Time			77		ns
$t_{d(off)}$	Turn-Off Delay Time			165		ns
t_f	Fall Time			88		ns
E_{on}	Turn-On Switching Loss			17.0		mJ
E_{off}	Turn-Off Switching Loss			6.14		mJ

Body Diode Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	$I_S=73\text{A}, V_{GS}=-4\text{V}, T_J=25^\circ\text{C}$		3.35		V
		$I_S=73\text{A}, V_{GS}=-4\text{V}, T_J=150^\circ\text{C}$		3.25		
		$I_S=73\text{A}, V_{GS}=-4\text{V}, T_J=175^\circ\text{C}$		3.20		
Q_r	Diode Reverse Recovery Charge	$V_R=800\text{V}, I_S=200\text{A}, -di/dt=1390\text{A}/\mu\text{s}, L_S=40\text{nH}, V_{GS}=-4\text{V}, T_J=25^\circ\text{C}$		0.11		μC
I_{rrm}	Peak Reverse Recovery Current			8.4		A
E_{rec}	Reverse Recovery Energy			0.03		mJ
Q_r	Diode Reverse Recovery Charge	$V_R=800\text{V}, I_S=200\text{A}, -di/dt=1600\text{A}/\mu\text{s}, L_S=40\text{nH}, V_{GS}=-4\text{V}, T_J=150^\circ\text{C}$		1.5		μC
I_{rrm}	Peak Reverse Recovery Current			38		A
E_{rec}	Reverse Recovery Energy			0.72		mJ
Q_r	Diode Reverse Recovery Charge	$V_R=800\text{V}, I_S=200\text{A}, -di/dt=1600\text{A}/\mu\text{s}, L_S=40\text{nH}, V_{GS}=-4\text{V}, T_J=175^\circ\text{C}$		1.65		μC
I_{rrm}	Peak Reverse Recovery Current			40		A
E_{rec}	Reverse Recovery Energy			0.89		mJ

Discrete Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per Mosfet)		0.116	0.133	K/W

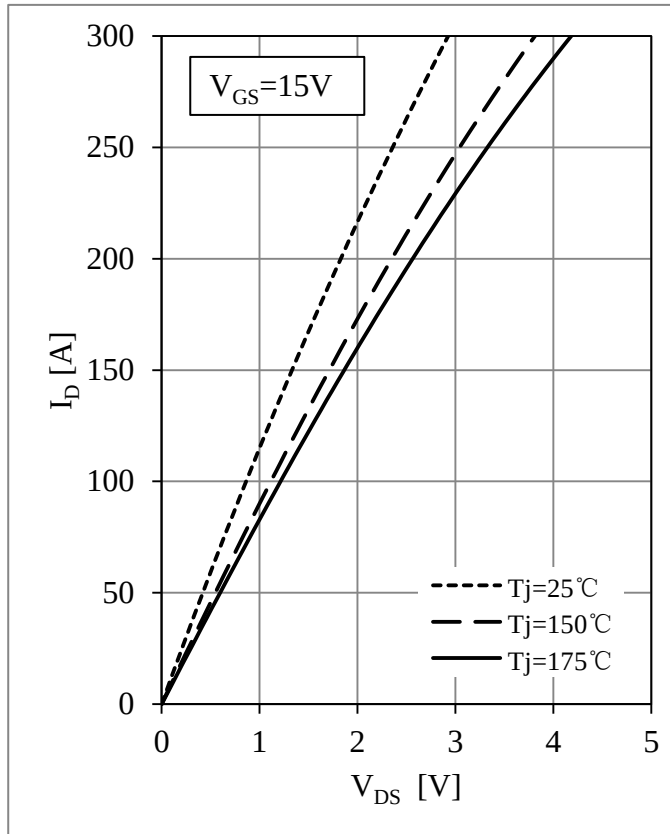


Fig 1. MOSFET Output Characteristics

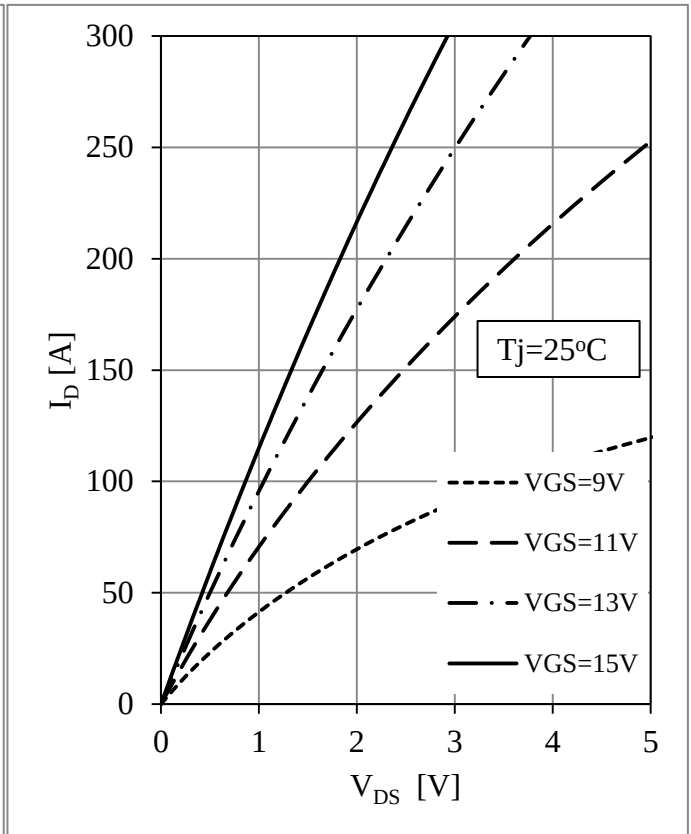


Fig 2. MOSFET Output Characteristics

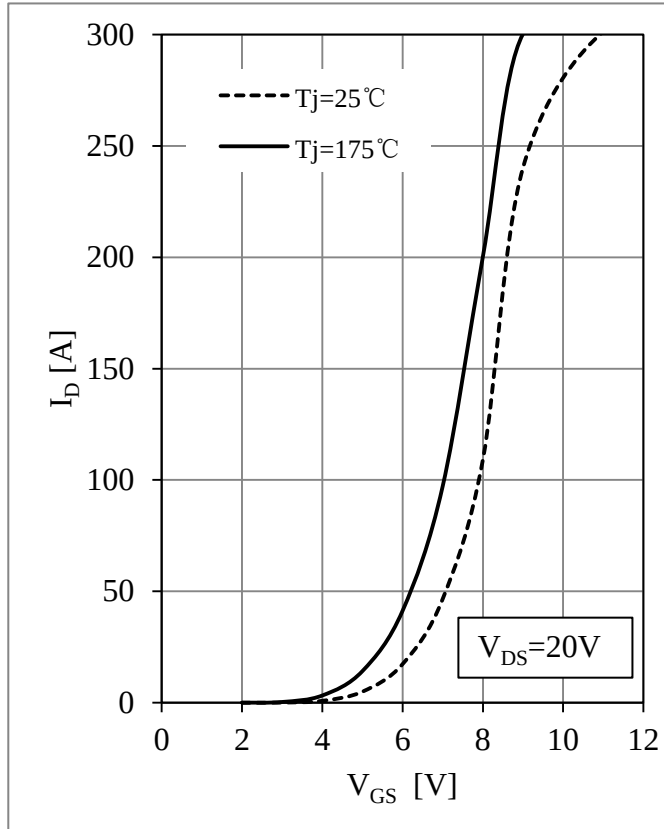
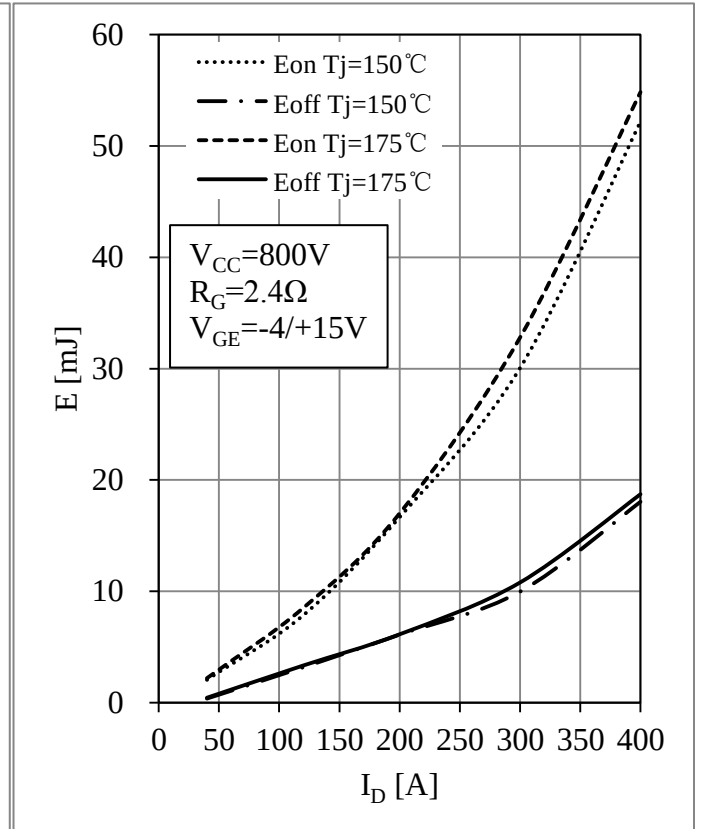


Fig 3. MOSFET Transfer Characteristics

Fig 4. MOSFET Switching Loss vs. I_{DS}

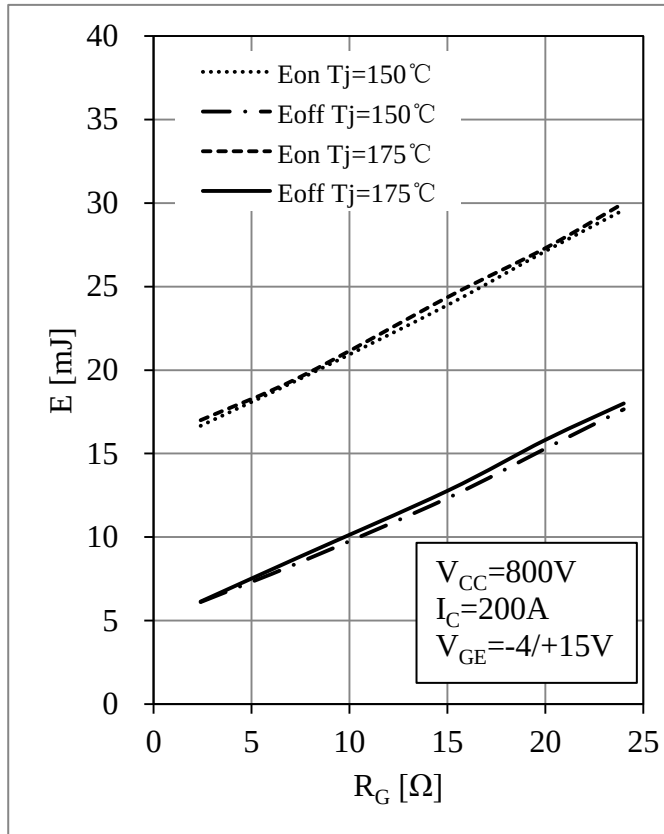
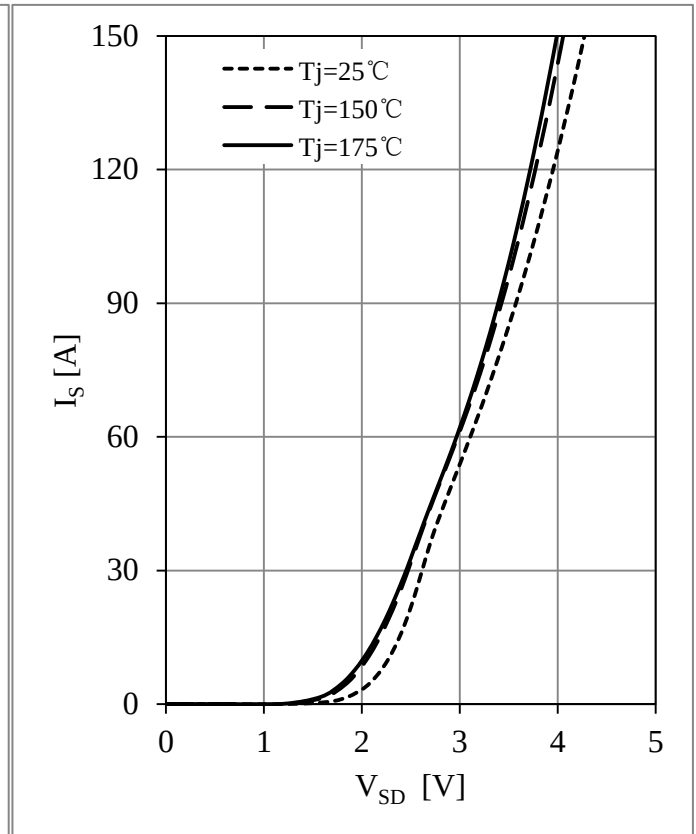
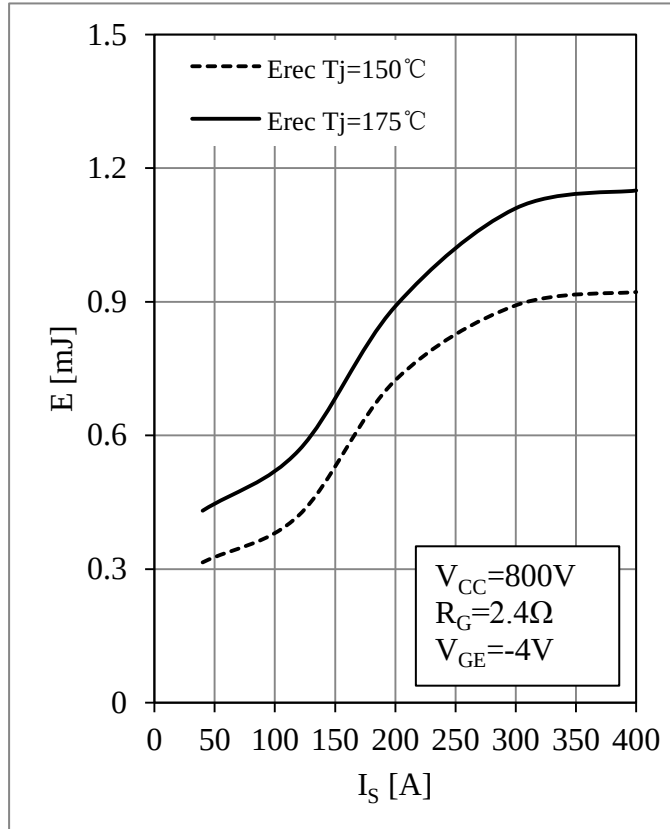
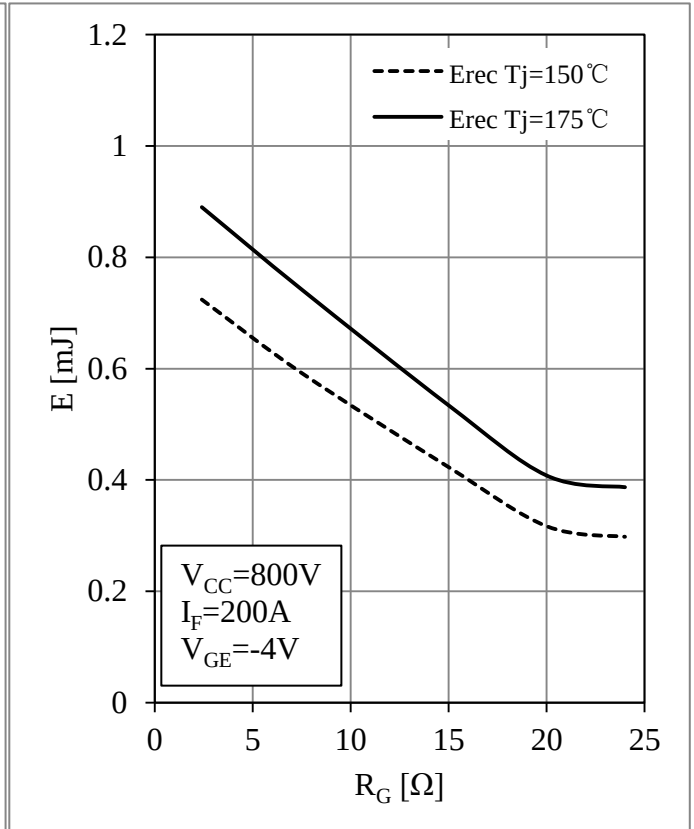
Fig 5. MOSFET Switching Loss vs. R_G 

Fig 6. Body Diode Characteristics

Fig 7. Body Diode Switching Loss vs. I_S Fig 8. Body Diode Switching Loss vs. R_G

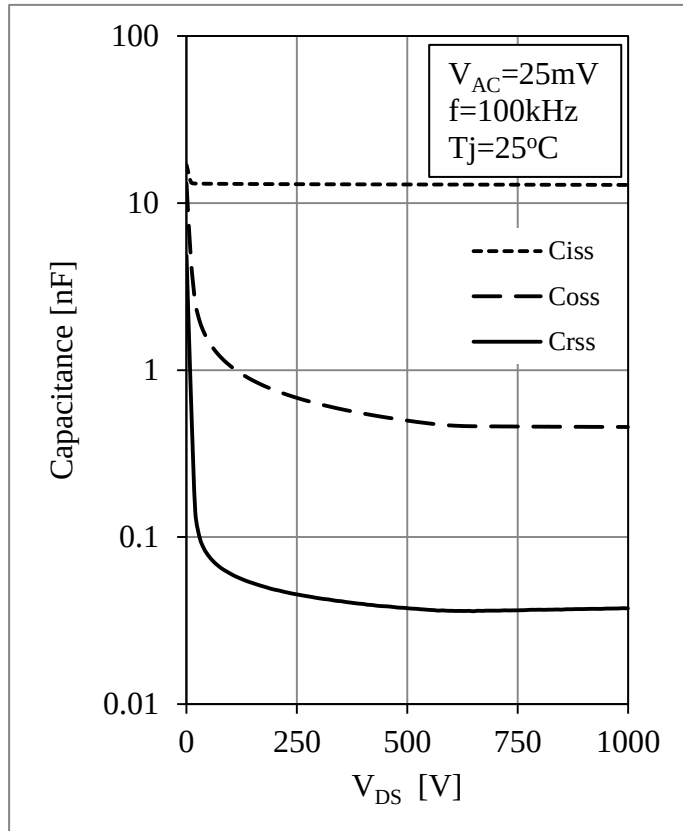
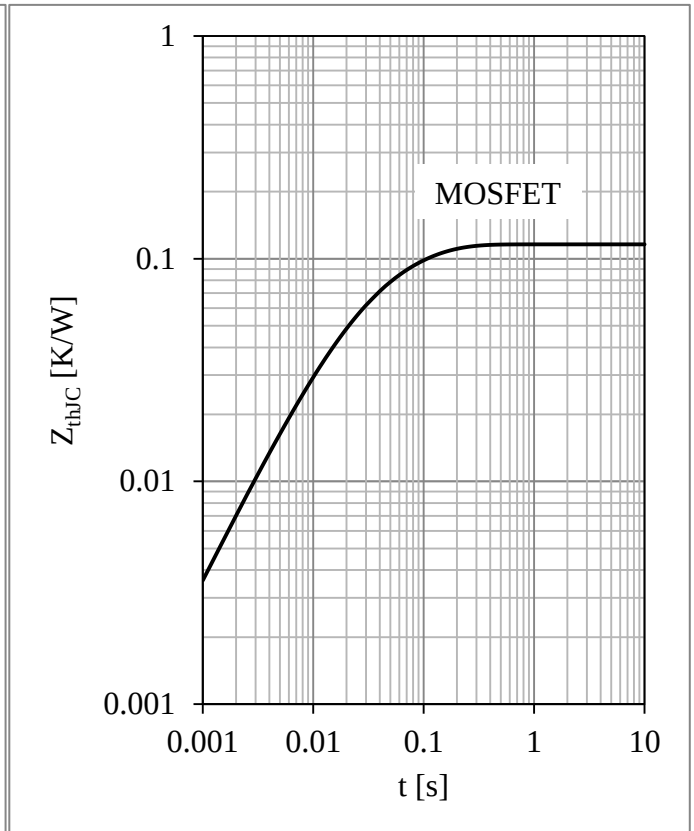
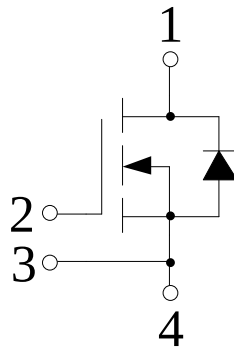
Fig 9. Capacitance vs. V_{DS} 

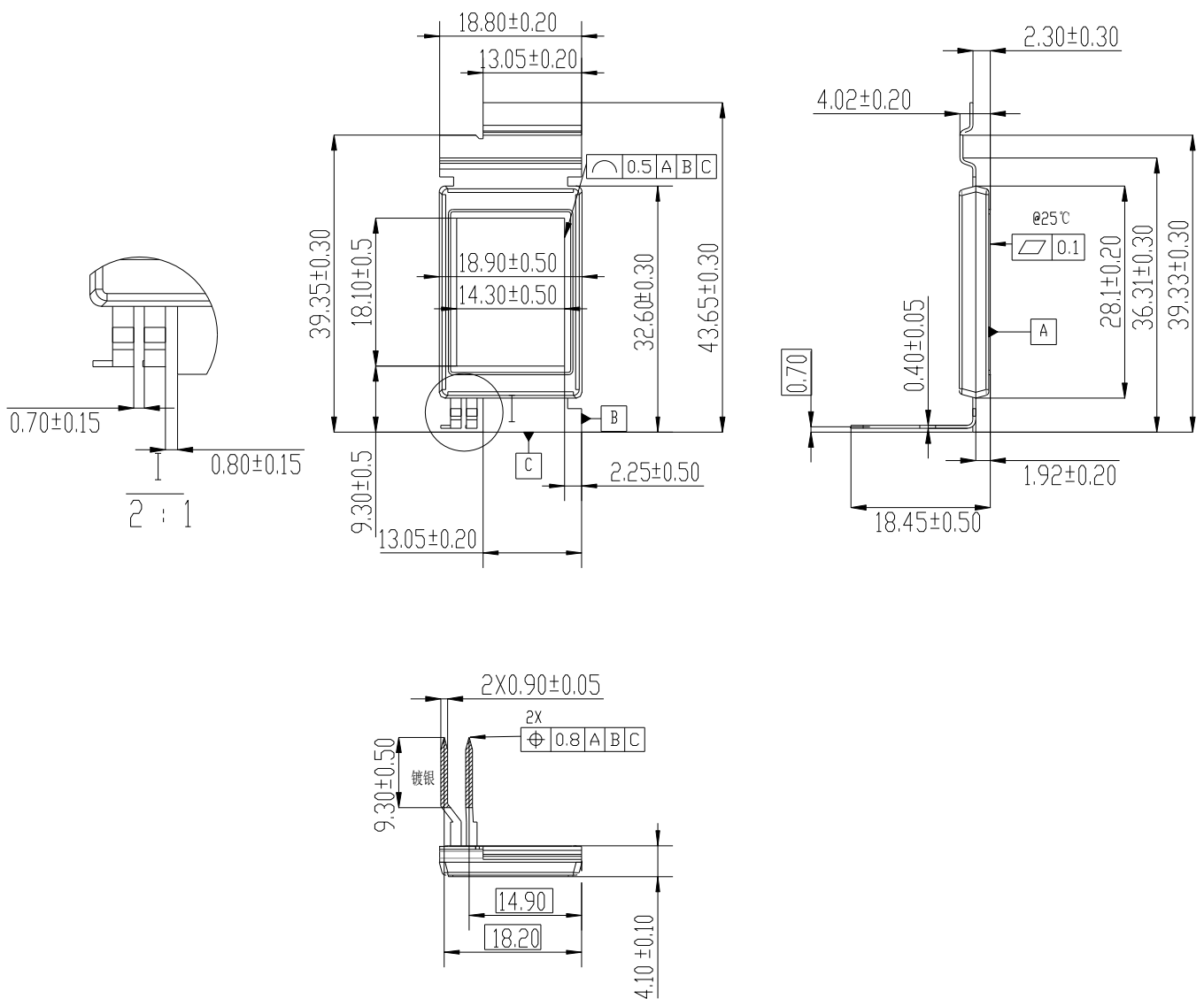
Fig 10. MOSFET Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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