

STARPOWER

SEMICONDUCTOR

SiC MOSFET

DM50C08T6

750V/5.00 mΩ Mosfet without Diode

General Description

STARPOWER provides a MOSFET Power Discrete with ultra low conduction loss as well as low switching loss.

They are designed for the applications such as hybrid and electric vehicle.

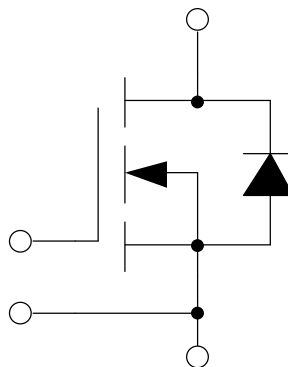
Features

- 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_{DS}	Drain-Source Voltage	750	V
V_{GSSmax}	Gate-Source Voltage	-8/+19	V
V_{GSSop}	Gate-Source Voltage	-4/+15	V
I_D	Drain Current @ $T_C=100^{\circ}\text{C}$	284	A
I_{DM}	Pulsed Drain Current	568	A
P_D	Maximum Power Dissipation @ $T_{vj}=175^{\circ}\text{C}$	1127	W

Body Diode

Symbol	Description	Value	Unit
I_F	Source Current @ $T_C=100^{\circ}\text{C}$	159	A

Discrete

Symbol	Description	Values	Unit
T_{vjop}	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	$I_D=163\text{A}, V_{GS}=15\text{V}, T_{vj}=25^{\circ}\text{C}$		5.00		$\text{m}\Omega$
		$I_D=163\text{A}, V_{GS}=15\text{V}, T_{vj}=150^{\circ}\text{C}$		5.59		
		$I_D=163\text{A}, V_{GS}=15\text{V}, T_{vj}=175^{\circ}\text{C}$		7.50		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=45\text{mA}, V_{DS}=V_{GS}, T_{vj}=25^{\circ}\text{C}$	1.8	2.5	3.6	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			64	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			500	nA
R_{Gint}	Internal Gate Resistance			1.8		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=750\text{V}, f=100\text{kHz}$		14.6		nF
C_{oss}	Output Capacitance			0.68		nF
C_{rss}	Reverse Transfer Capacitance			0.05		nF
Q_g	Total Gate Charge	$I_D=163\text{A}, V_{DS}=400\text{V}, V_{GS}=-4/+15\text{V}$		534		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=450\text{V}, I_D=200\text{A}, R_G=7.5\Omega, L_S=60\text{nH}, V_{GS}=-4/+15\text{V}, T_{vj}=25^{\circ}\text{C}$		27		ns
t_r	Rise Time			58		ns
$t_{d(off)}$	Turn-Off Delay Time			275		ns
t_f	Fall Time			56		ns
E_{on}	Turn-On Switching Loss			5.18		mJ
E_{off}	Turn-Off Switching Loss			3.91		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=450\text{V}, I_D=200\text{A}, R_G=7.5\Omega, L_S=60\text{nH}, V_{GS}=-4/+15\text{V}, T_{vj}=150^{\circ}\text{C}$		33		ns
t_r	Rise Time			62		ns
$t_{d(off)}$	Turn-Off Delay Time			308		ns
t_f	Fall Time			68		ns
E_{on}	Turn-On Switching Loss			5.30		mJ
E_{off}	Turn-Off Switching Loss			5.33		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=450\text{V}, I_D=200\text{A}, R_G=7.5\Omega, L_S=60\text{nH}, V_{GS}=-4/+15\text{V}, T_{vj}=175^{\circ}\text{C}$		35		ns
t_r	Rise Time			63		ns
$t_{d(off)}$	Turn-Off Delay Time			320		ns
t_f	Fall Time			73		ns
E_{on}	Turn-On Switching Loss			5.33		mJ
E_{off}	Turn-Off Switching Loss			5.52		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	$I_S=82\text{A}, V_{GS}=-4\text{V}, T_{vj}=25^{\circ}\text{C}$		4.80		V
		$I_S=82\text{A}, V_{GS}=-4\text{V}, T_{vj}=150^{\circ}\text{C}$		4.40		
		$I_S=82\text{A}, V_{GS}=-4\text{V}, T_{vj}=175^{\circ}\text{C}$		4.30		
t_{rr}	Reverse Recovery Time	$V_R=450\text{V}, I_F=200\text{A},$ $-di/dt=2920\text{A}/\mu\text{s}, L_S=60\text{nH},$ $V_{GE}=-8\text{V}, T_{vj}=25^{\circ}\text{C}$		33		ns
Q_r	Recovered Charge			0.63		μC
I_{RM}	Peak Reverse Recovery Current			34		A
E_{rec}	Reverse Recovery Energy			0.03		mJ
t_{rr}	Reverse Recovery Time	$V_R=450\text{V}, I_F=200\text{A},$ $-di/dt=3180\text{A}/\mu\text{s}, L_S=60\text{nH},$ $V_{GE}=-8\text{V}, T_{vj}=150^{\circ}\text{C}$		41		ns
Q_r	Recovered Charge			1.13		μC
I_{RM}	Peak Reverse Recovery Current			52		A
E_{rec}	Reverse Recovery Energy			0.06		mJ
t_{rr}	Reverse Recovery Time	$V_R=450\text{V}, I_F=200\text{A},$ $-di/dt=3280\text{A}/\mu\text{s}, L_S=60\text{nH},$ $V_{GE}=-8\text{V}, T_{vj}=175^{\circ}\text{C}$		42		ns
Q_r	Recovered Charge			1.32		μC
I_{RM}	Peak Reverse Recovery Current			55		A
E_{rec}	Reverse Recovery Energy			0.07		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

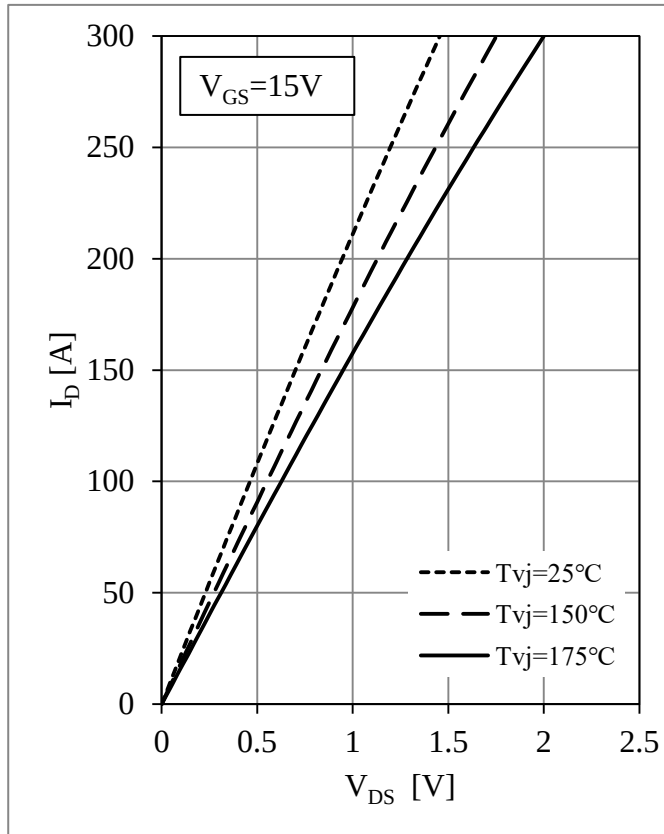


Fig 1. MOSFET Output Characteristics

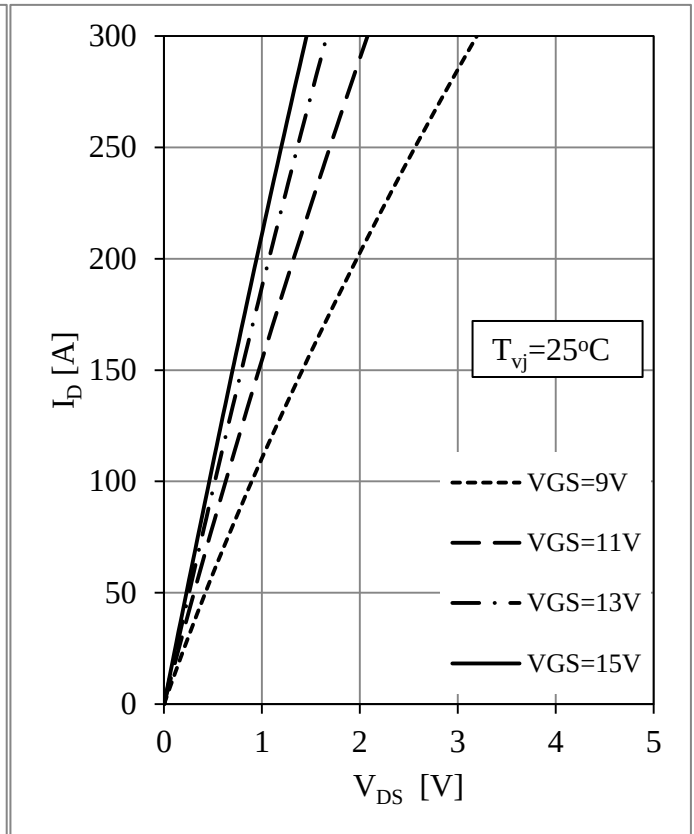


Fig 2. MOSFET Output Characteristics

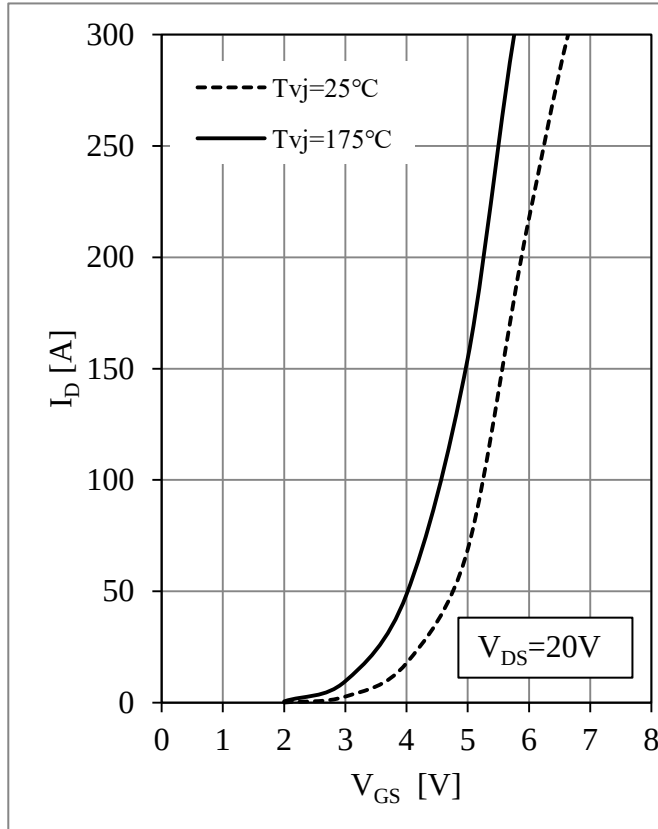
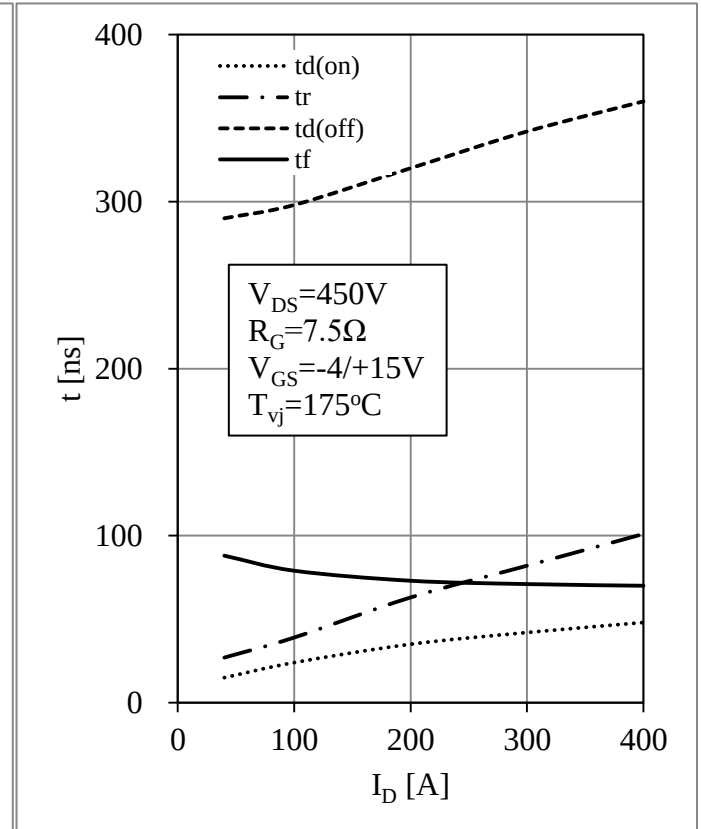
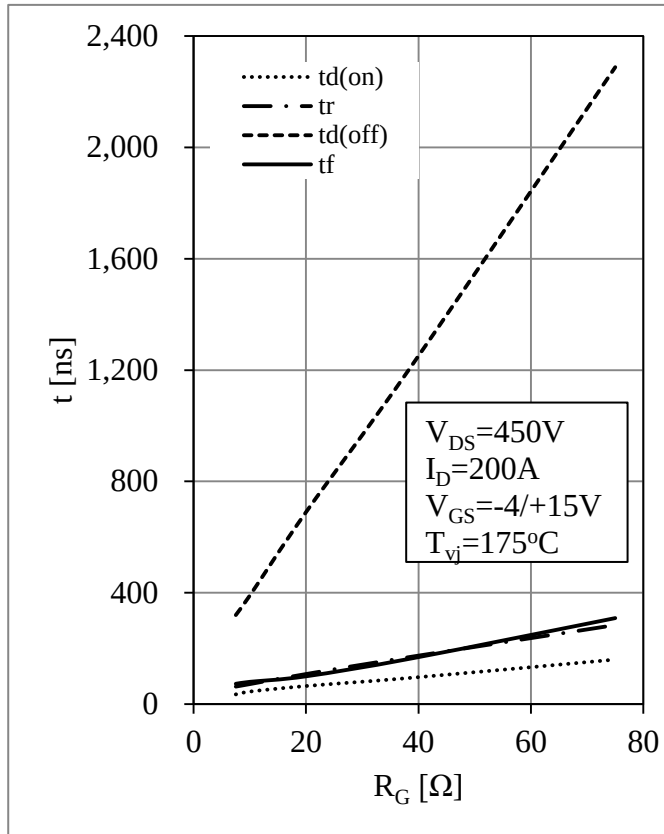
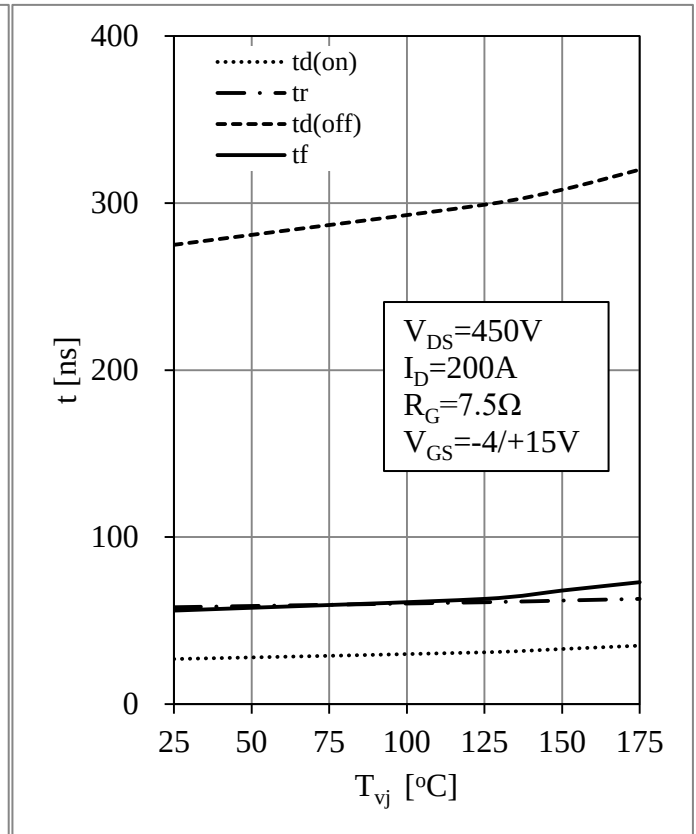
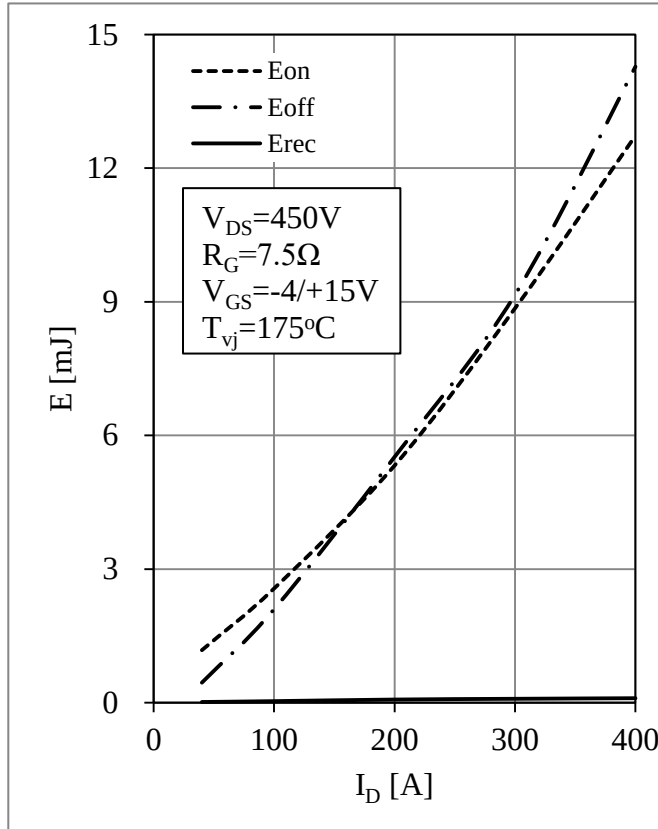
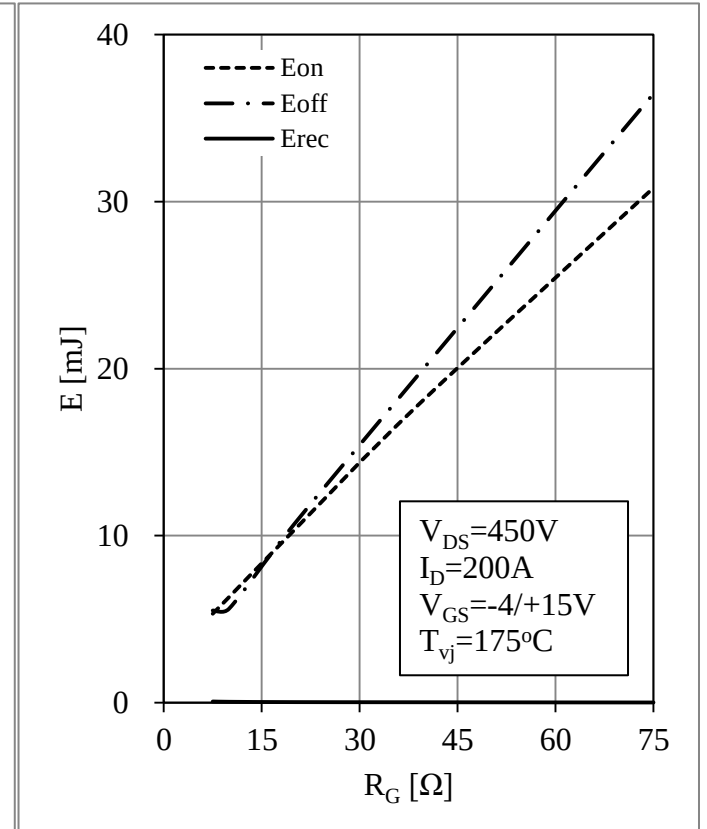


Fig 3. MOSFET Transfer Characteristics

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

Fig 5. MOSFET Switching Times vs. R_G Fig 6. MOSFET Switching Times vs. T_{vj} Fig 7. Switching Energy Loss vs. I_{DS} Fig 8. Switching Energy Loss vs. R_G

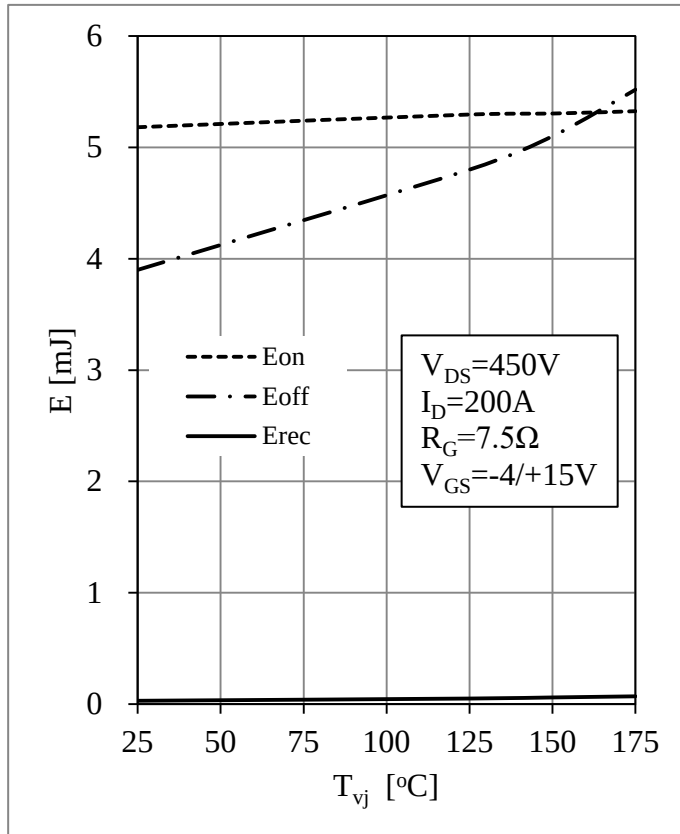
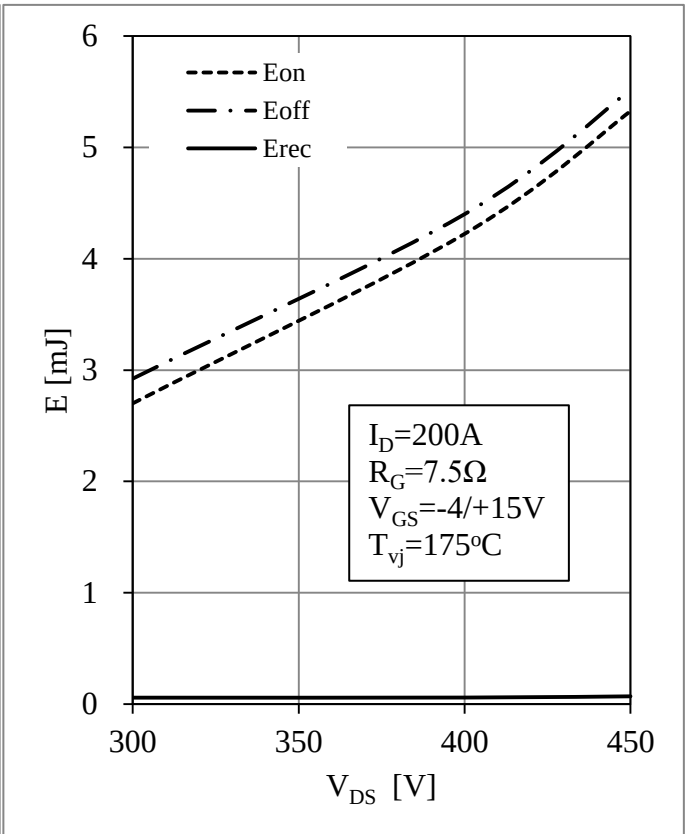
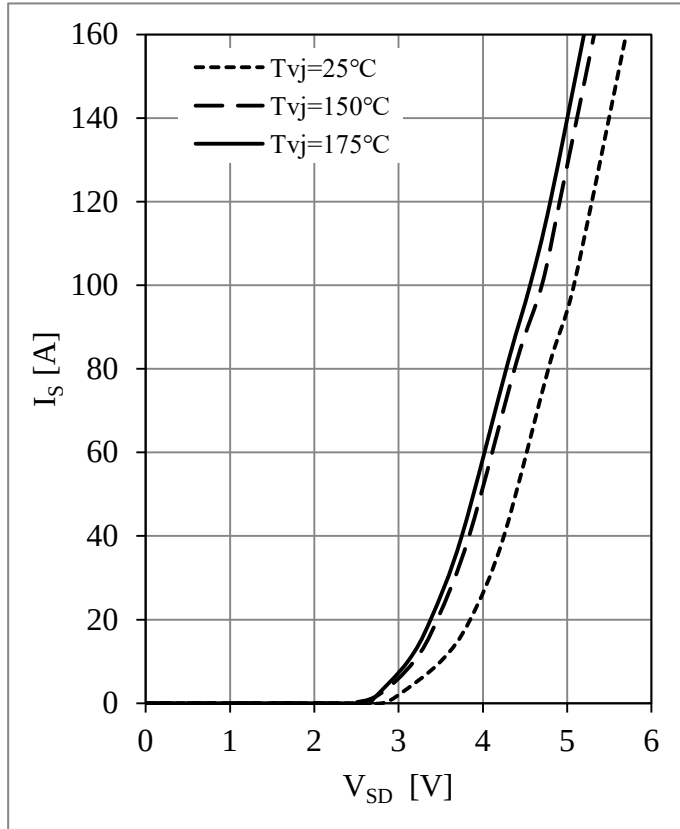
Fig 9. Switching Energy Loss vs. T_{vj} Fig 10. Switching Energy Loss vs. V_{DS} 

Fig 11. Body Diode Characteristics

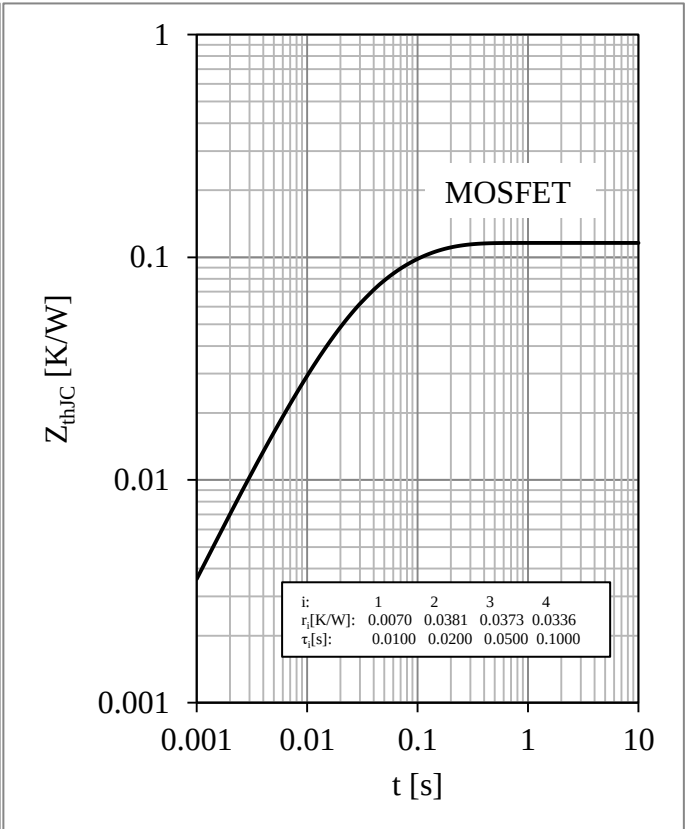
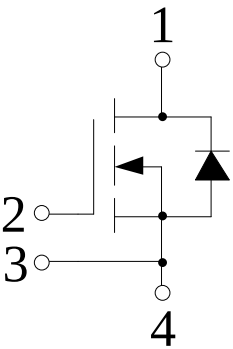


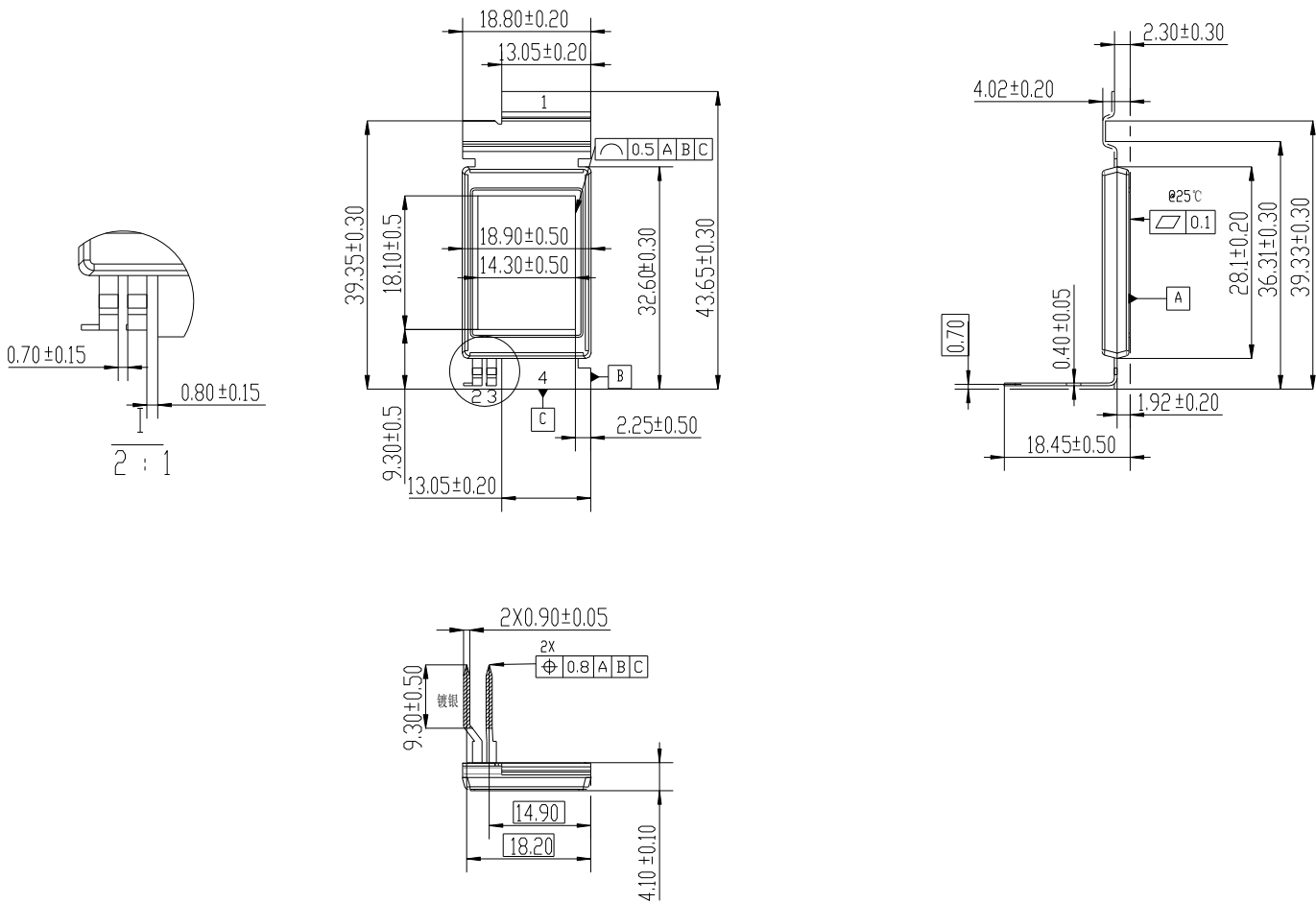
Fig 12. MOSFET Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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