

DOSEMI**SiC MOSFET****DM170S12TCRB****1200V/17mΩ SiC 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.

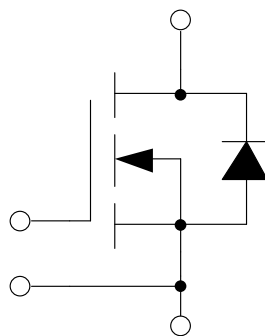
Features

- SiC power MOSFET
- Low $R_{DS(on)}$
- Chip sintering technology
- Low inductance case avoid oscillations
- 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 @ $T_{vj}=175^{\circ}\text{C}$	118	A
P_D	Maximum Power Dissipation @ $T_{vj}=175^{\circ}\text{C}$	355	W

Body Diode

Symbol	Description	Value	Unit
I_F	Source Current @ $T_{vj}=175^{\circ}\text{C}$	157	A

Discrete

Symbol	Description	Values	Unit
T_{jop}	Operating Junction Temperature	-40 to +175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$
T_S	Soldering Temperature, 1.6mm from case for 10s	260	$^{\circ}\text{C}$

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	$I_D=76\text{A}, V_{GS}=15\text{V}, T_{vj}=25^{\circ}\text{C}$		17.0		$\text{m}\Omega$
		$I_D=76\text{A}, V_{GS}=15\text{V}, T_{vj}=150^{\circ}\text{C}$		26.4		
		$I_D=76\text{A}, V_{GS}=15\text{V}, T_{vj}=175^{\circ}\text{C}$		29.0		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=17.1\text{mA}, V_{DS}=V_{GS}, T_{vj}=25^{\circ}\text{C}$		3.10		V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			100	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			200	nA
R_{Gint}	Internal Gate Resistance			0		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=800\text{V}, f=100\text{kHz}$		6.25		nF
C_{oss}	Output Capacitance			0.37		nF
C_{rss}	Reverse Transfer Capacitance			0.02		nF
Q_g	Total Gate Charge	$I_D=62.1\text{A}, V_{DS}=800\text{V}, V_{GS}=-4/+15\text{V}$		0.17		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=62.1\text{A}, R_{Gon}=3.9\Omega, R_{Goff}=5.1\Omega, V_{GS}=-4/+15\text{V}, L_S=40\text{nH}, T_{vj}=25^{\circ}\text{C}$		31		ns
t_r	Rise Time			14		ns
$t_{d(off)}$	Turn-Off Delay Time			46		ns
t_f	Fall Time			27		ns
E_{on}	Turn-On Switching Loss			0.86		mJ
E_{off}	Turn-Off Switching Loss			0.73		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=62.1\text{A}, R_{Gon}=3.9\Omega, R_{Goff}=5.1\Omega, V_{GS}=-4/+15\text{V}, L_S=40\text{nH}, T_{vj}=150^{\circ}\text{C}$		31		ns
t_r	Rise Time			14		ns
$t_{d(off)}$	Turn-Off Delay Time			46		ns
t_f	Fall Time			26		ns
E_{on}	Turn-On Switching Loss			1.12		mJ
E_{off}	Turn-Off Switching Loss			0.70		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=62.1\text{A}, R_{Gon}=3.9\Omega, R_{Goff}=5.1\Omega, V_{GS}=-4/+15\text{V}, L_S=40\text{nH}, T_{vj}=175^{\circ}\text{C}$		31		ns
t_r	Rise Time			14		ns
$t_{d(off)}$	Turn-Off Delay Time			47		ns
t_f	Fall Time			26		ns
E_{on}	Turn-On Switching Loss			1.15		mJ
E_{off}	Turn-Off Switching Loss			0.71		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	$I_S=38\text{A}, V_{GS}=-4\text{V}, T_{vj}=25^{\circ}\text{C}$		4.15		V
		$I_S=38\text{A}, V_{GS}=-4\text{V}, T_{vj}=175^{\circ}\text{C}$		3.60		

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

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per Mosfet)		0.255	0.281	K/W

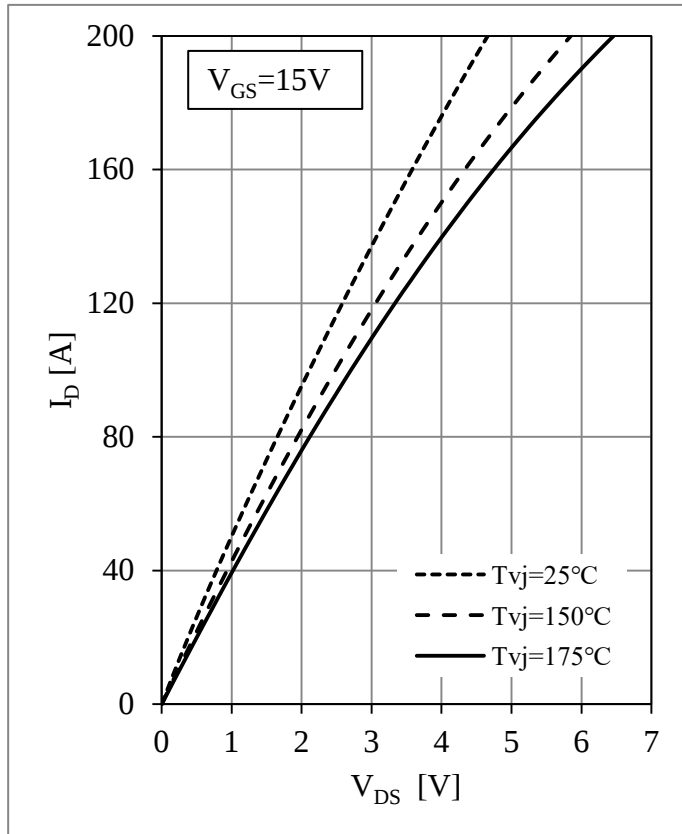


Fig 1. MOSFET Output Characteristics

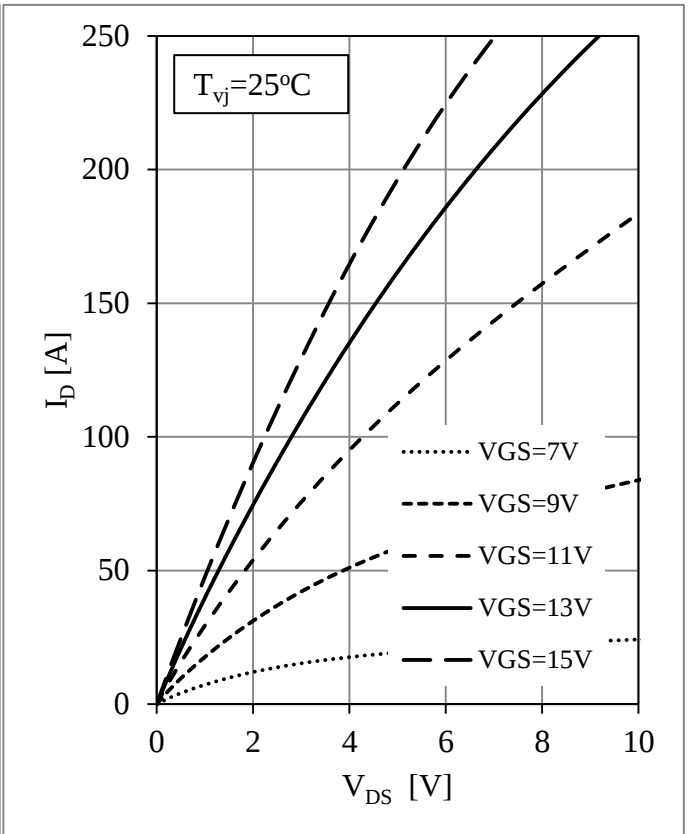


Fig 2. MOSFET Output Characteristics

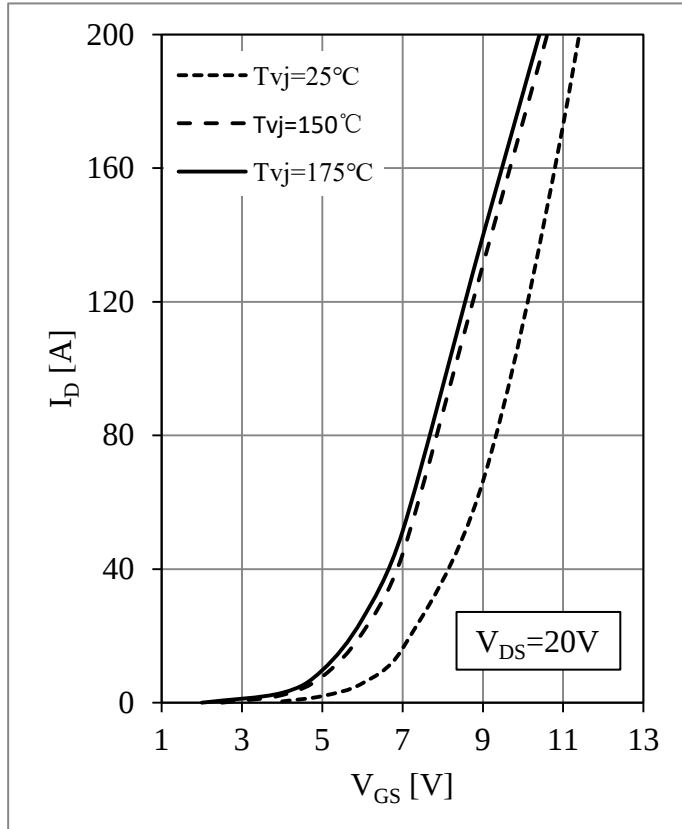
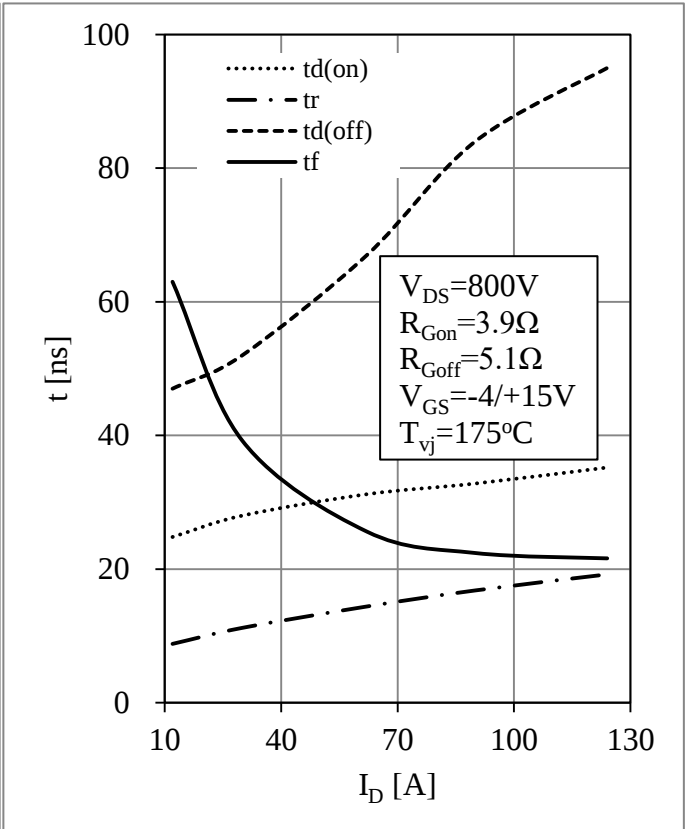
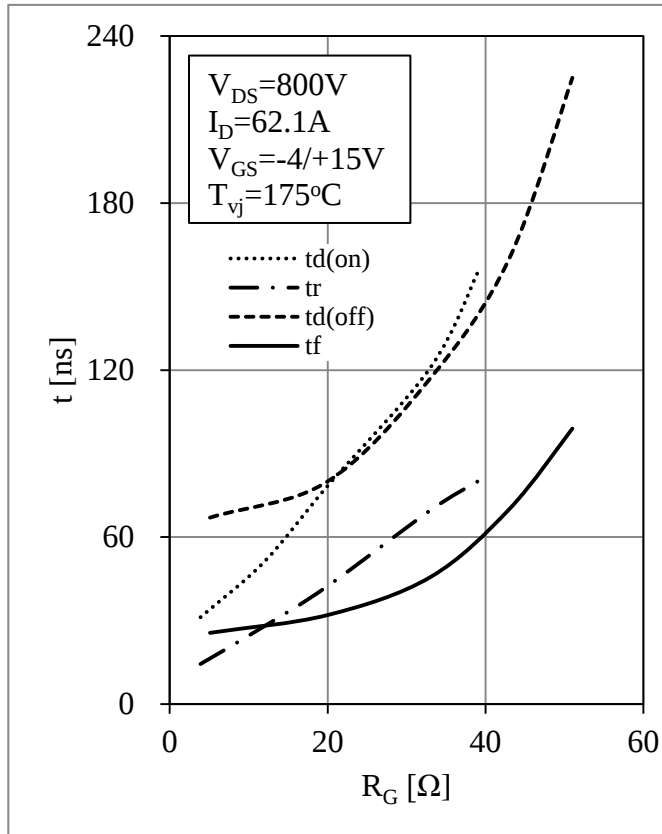
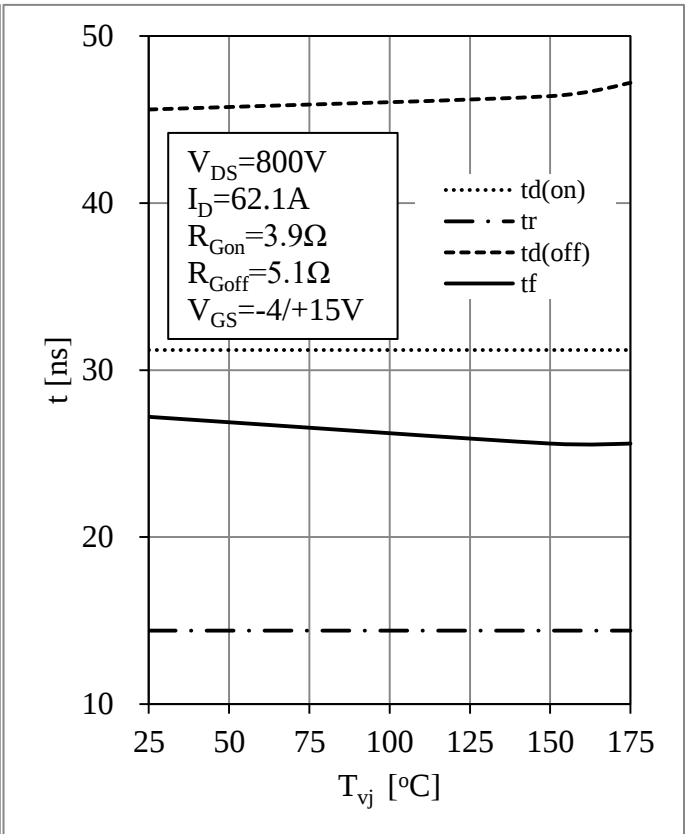
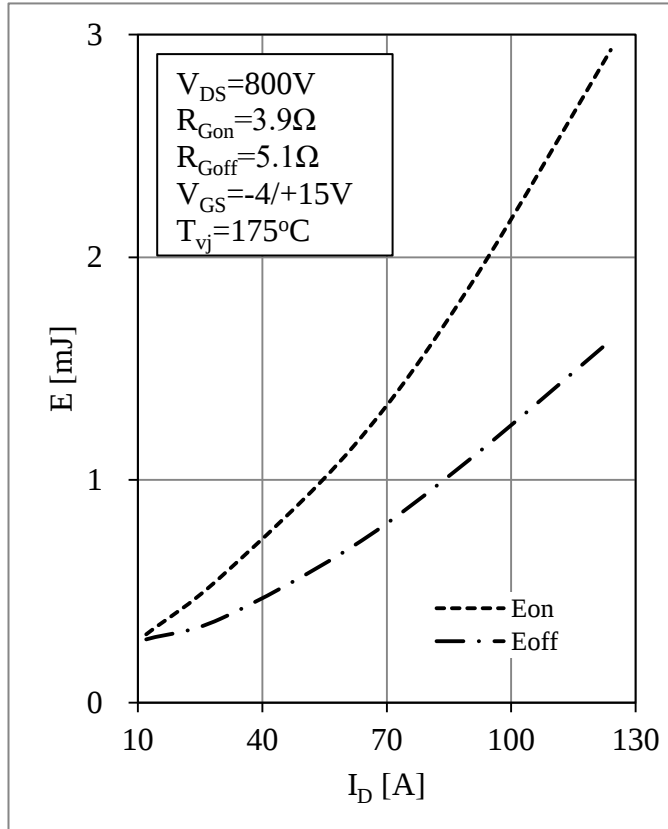
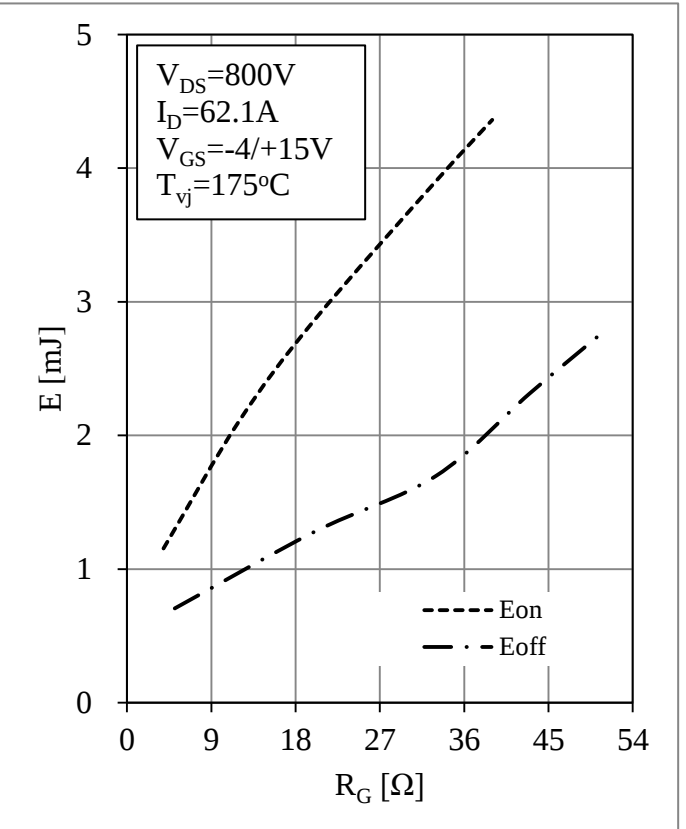


Fig 3. MOSFET Transfer Characteristics

Fig 4. MOSFET Switching Times as I_{DS}

Fig 5. MOSFET Switching Times as. 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

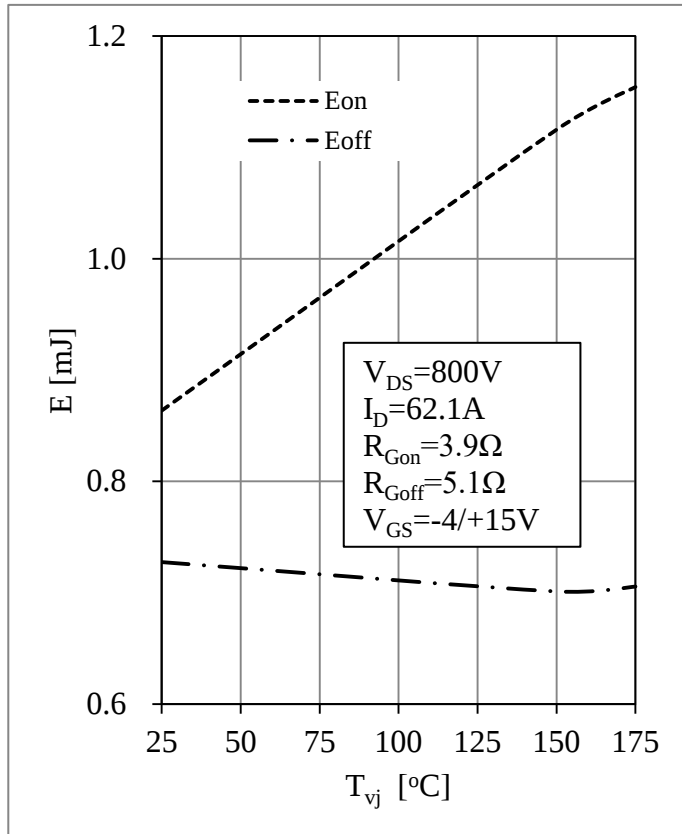
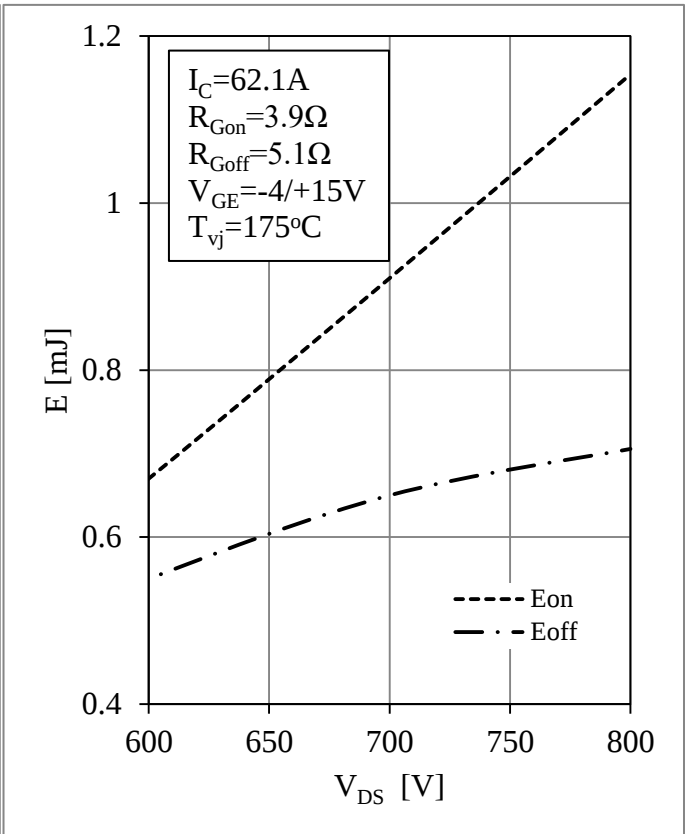
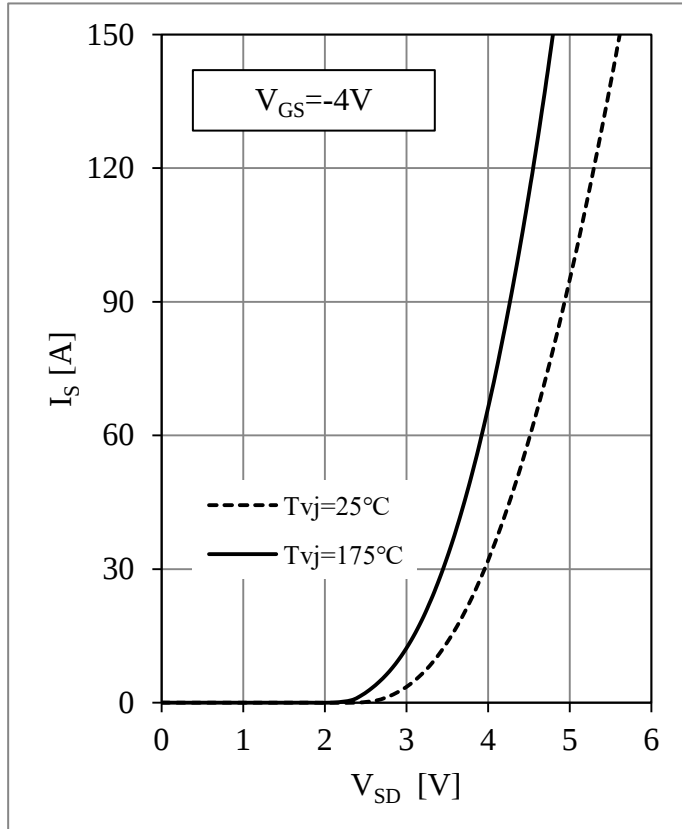
Fig 9. Switching Energy Loss vs. T_{vj} Fig 10. Switching Energy Loss vs. V_{DS} 

Fig 11. Body Diode Characteristics

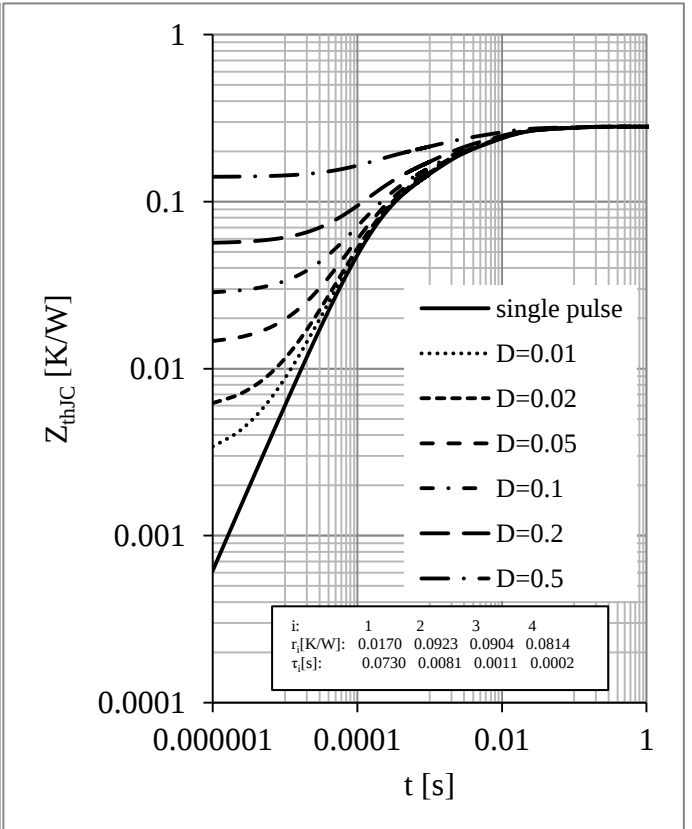
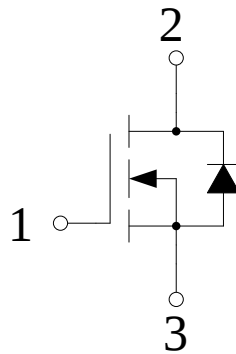


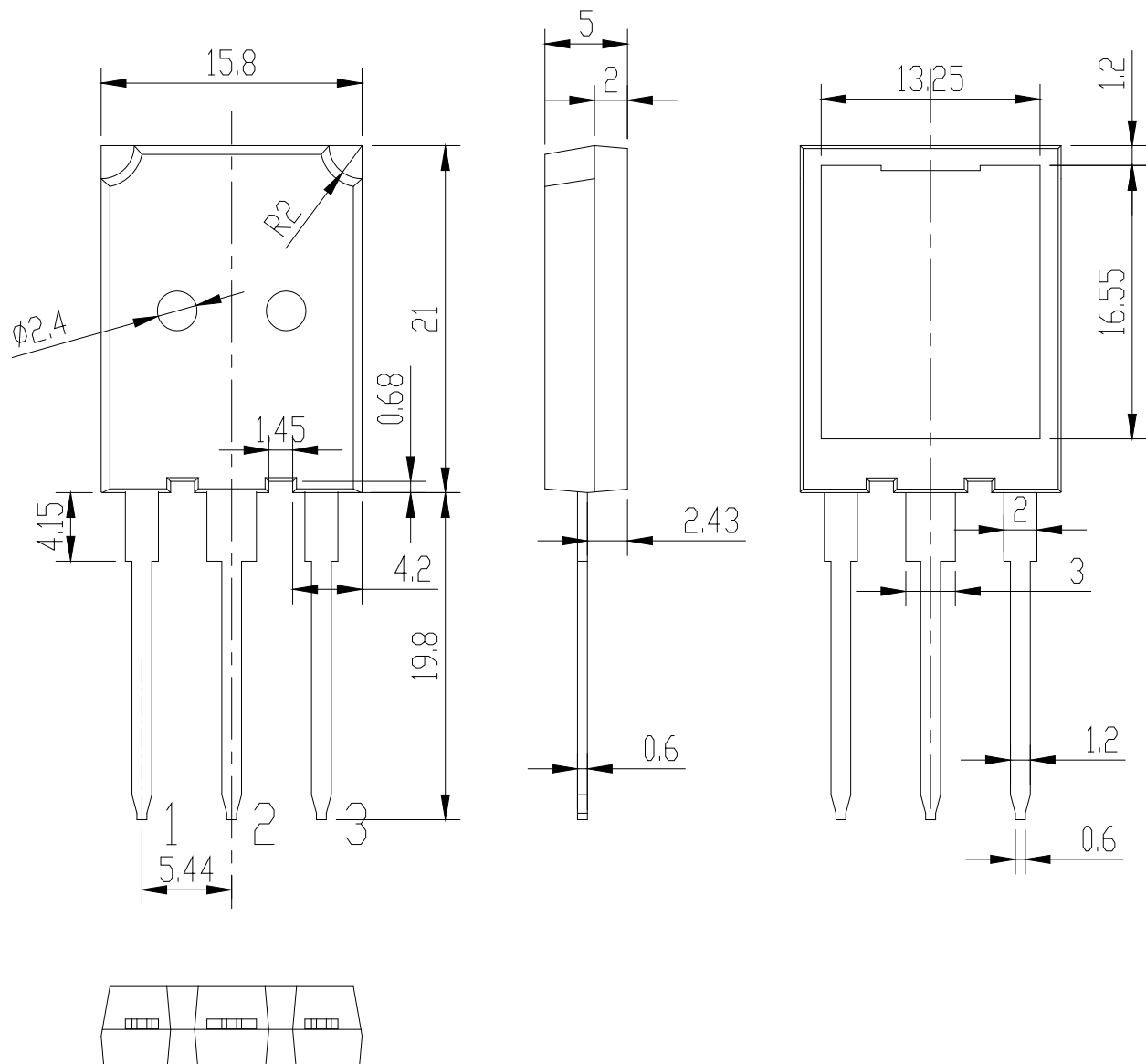
Fig 12. MOSFET Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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