

# DOSEMI

## SiC MOSFET

### DM800S12EBRB

**1200V/80mΩ 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.

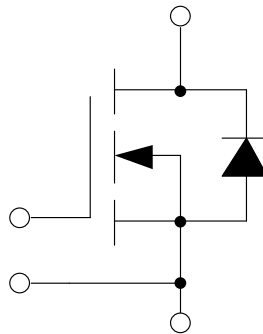
#### Features

- SiC power MOSFET
- Low  $R_{DS(on)}$
- Low inductance case avoid oscillations
- ROHS

#### Typical Applications

- DC/DC converter
- On board charger (OBC)
- Inductive charger systems

#### Equivalent Circuit Schematic



Type	Package	Marking	Shipping
DM800S12EBRB	TO-263-7L	DM800S12EBRB	Taping

**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/+22	V
$V_{GSSop}$	Gate-Source Voltage	-4/+15	V
$I_D$	Drain Current @ $T_{vj}=175^{\circ}\text{C}$	42	A
$P_D$	Maximum Power Dissipation @ $T_{vj}=175^{\circ}\text{C}$	172	W

**Body Diode**

Symbol	Description	Value	Unit
$I_F$	Source Current @ $T_{vj}=175^{\circ}\text{C}$	35	A

**Discrete**

Symbol	Description	Values	Unit
$T_{vjop}$	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	$I_D=20\text{A}, V_{GS}=15\text{V}, T_{vj}=25^\circ\text{C}$		80.0		m $\Omega$	
		$I_D=20\text{A}, V_{GS}=15\text{V}, T_{vj}=150^\circ\text{C}$		98.7			
		$I_D=20\text{A}, V_{GS}=15\text{V}, T_{vj}=175^\circ\text{C}$		105			
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=5.0\text{mA}, V_{DS}=V_{GS}, T_{vj}=25^\circ\text{C}$		2.8		V	
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_{vj}=25^\circ\text{C}$			100	$\mu\text{A}$	
$I_{GSS}$	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			3.3		$\Omega$	
$C_{iss}$	Input Capacitance			1.67		nF	
$C_{oss}$	Output Capacitance	$V_{GS}=0\text{V}, V_{DS}=800\text{V}, f=100\text{kHz}$		67.4		pF	
$C_{rss}$	Reverse Transfer Capacitance			4.38		pF	
$Q_g$	Total Gate Charge	$I_D=18\text{A}, V_{DS}=800\text{V}, V_{GS}=-4/+15\text{V}$		36.0		nC	
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=20\text{A}, R_{Gon}=10\Omega, R_{Goff}=5.6\Omega, V_{GS}=-4/+15\text{V}, L_S=40\text{nH}, T_{vj}=25^\circ\text{C}$		6		ns	
$t_r$	Rise Time			10		ns	
$t_{d(off)}$	Turn-Off Delay Time			12		ns	
$t_f$	Fall Time			39		ns	
$E_{on}$	Turn-On Switching Loss			0.65		mJ	
$E_{off}$	Turn-Off Switching Loss			0.09		mJ	
$t_{d(on)}$	Turn-On Delay Time		$V_{DS}=800\text{V}, I_D=20\text{A}, R_{Gon}=10\Omega, R_{Goff}=5.6\Omega, V_{GS}=-4/+15\text{V}, L_S=40\text{nH}, T_{vj}=150^\circ\text{C}$		6		ns
$t_r$	Rise Time				10		ns
$t_{d(off)}$	Turn-Off Delay Time			13		ns	
$t_f$	Fall Time			39		ns	
$E_{on}$	Turn-On Switching Loss			0.71		mJ	
$E_{off}$	Turn-Off Switching Loss			0.09		mJ	
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=20\text{A}, R_{Gon}=10\Omega, R_{Goff}=5.6\Omega, V_{GS}=-4/+15\text{V}, L_S=40\text{nH}, T_{vj}=175^\circ\text{C}$			6		ns
$t_r$	Rise Time				10		ns
$t_{d(off)}$	Turn-Off Delay Time			13		ns	
$t_f$	Fall Time			39		ns	
$E_{on}$	Turn-On Switching Loss			0.72		mJ	
$E_{off}$	Turn-Off Switching Loss			0.09		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	$I_S=10\text{A}, V_{GS}=-4\text{V}, T_{vj}=25^\circ\text{C}$		4.65		V
		$I_S=10\text{A}, V_{GS}=-4\text{V}, T_{vj}=175^\circ\text{C}$		4.10		

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

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{thJC}$	Junction-to-Case (per Mosfet)		0.670	0.870	K/W

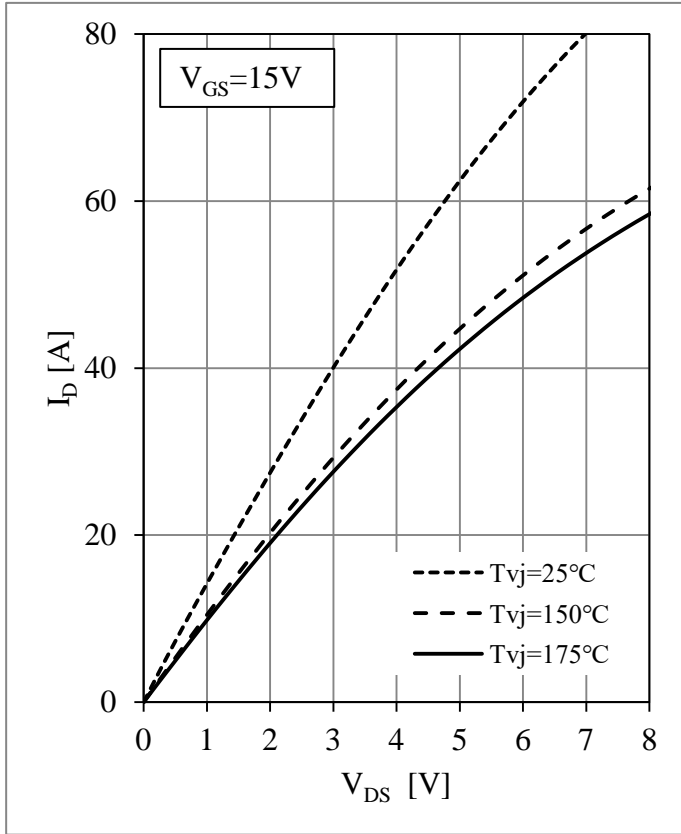


Fig 1. MOSFET Output Characteristics

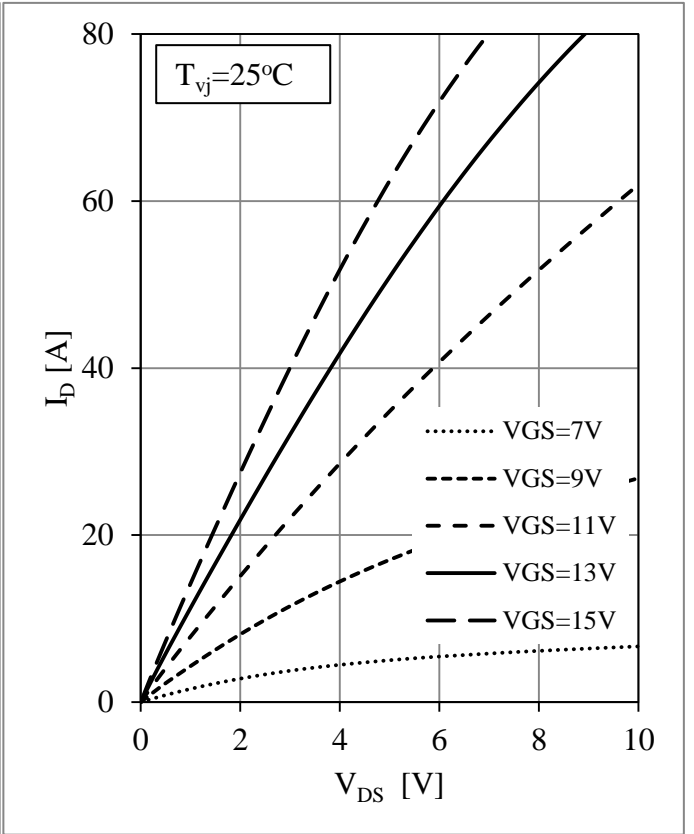


Fig 2. MOSFET Output Characteristics

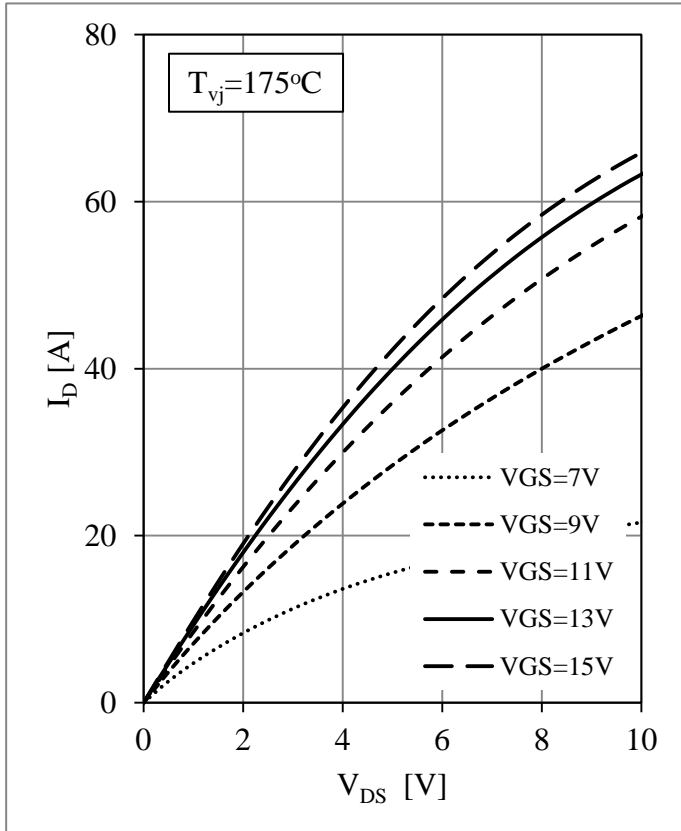


Fig 3. MOSFET Output Characteristics

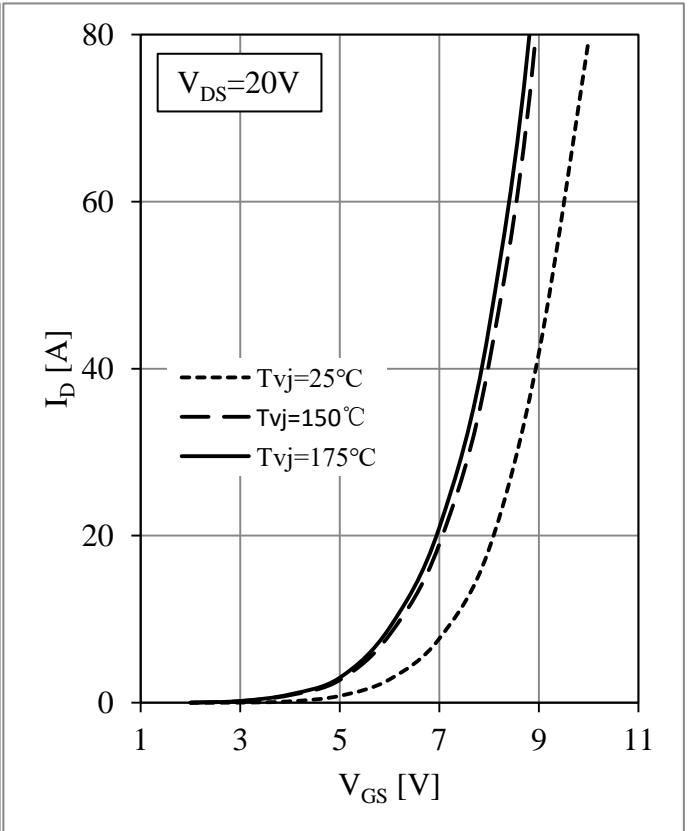


Fig 4. MOSFET Transfer Characteristics

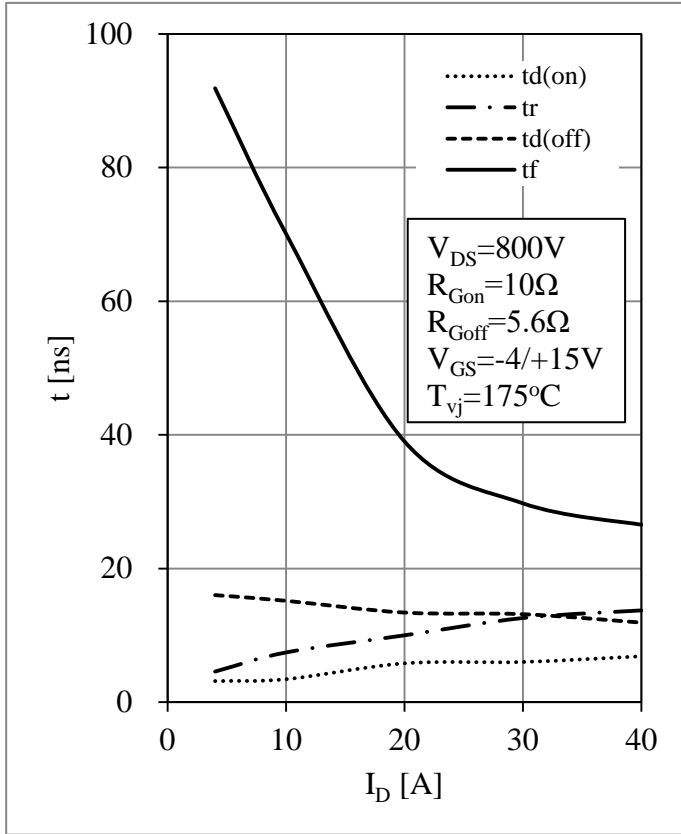


Fig 5. MOSFET Switching Times as.  $I_D$ s

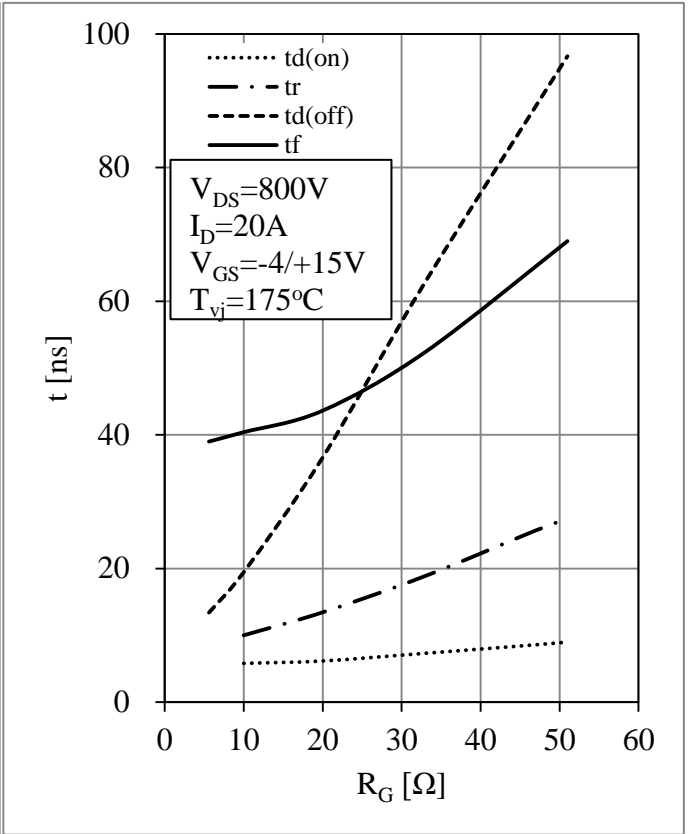


Fig 6. MOSFET Switching Times as.  $R_G$

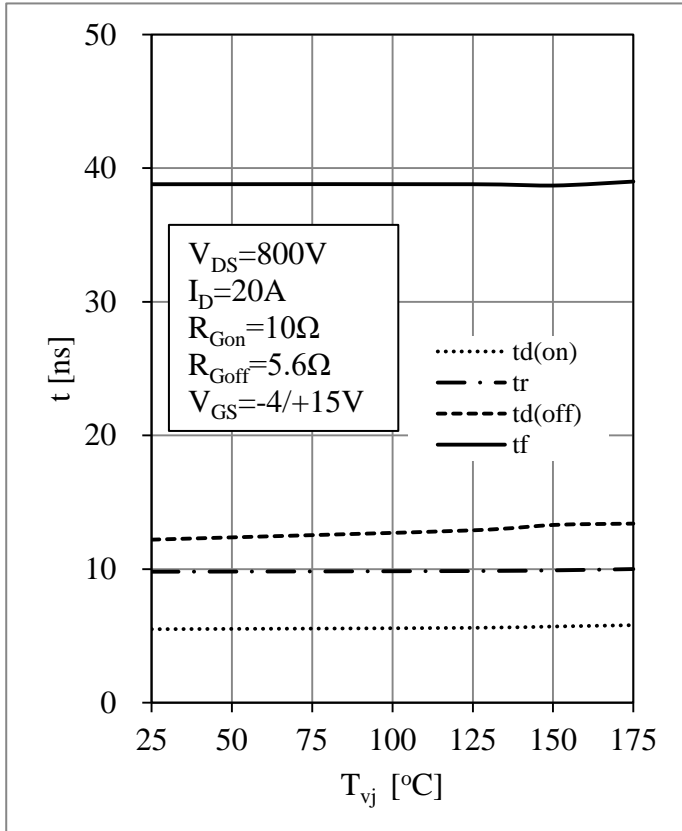


Fig 7. MOSFET Switching Times vs.  $T_{vj}$

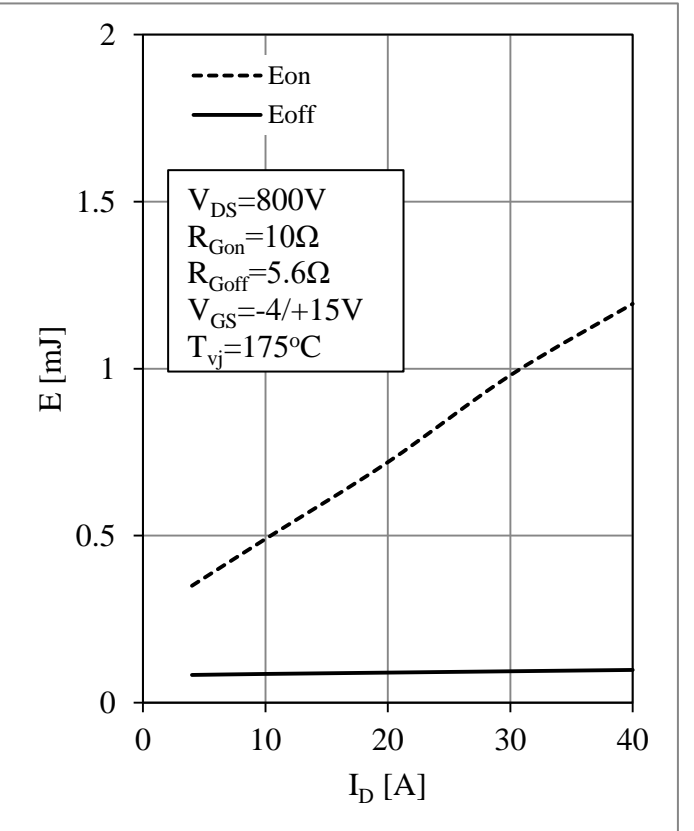


Fig 8. Switching Energy Loss vs.  $I_{DS}$

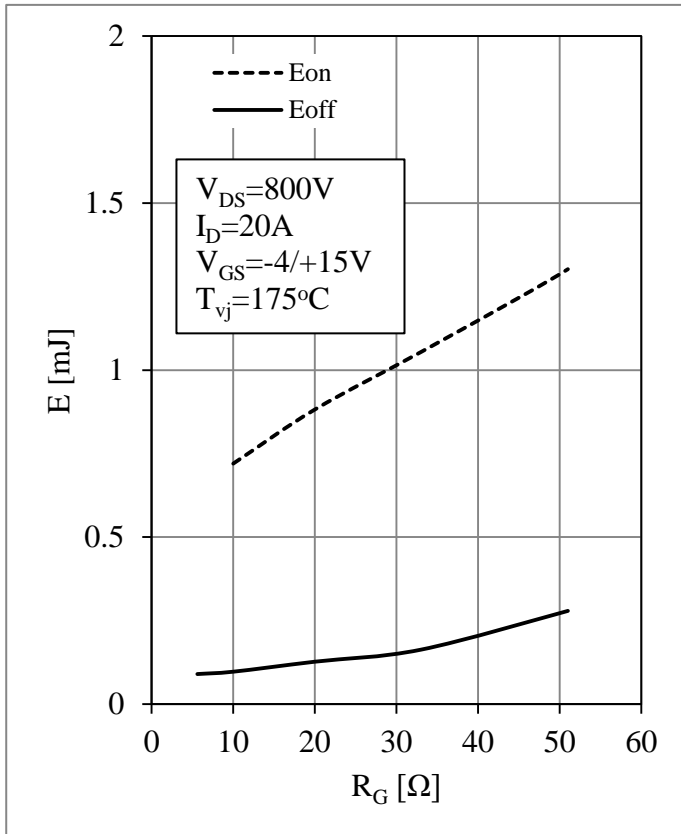


Fig 9. Switching Energy Loss vs.  $R_G$

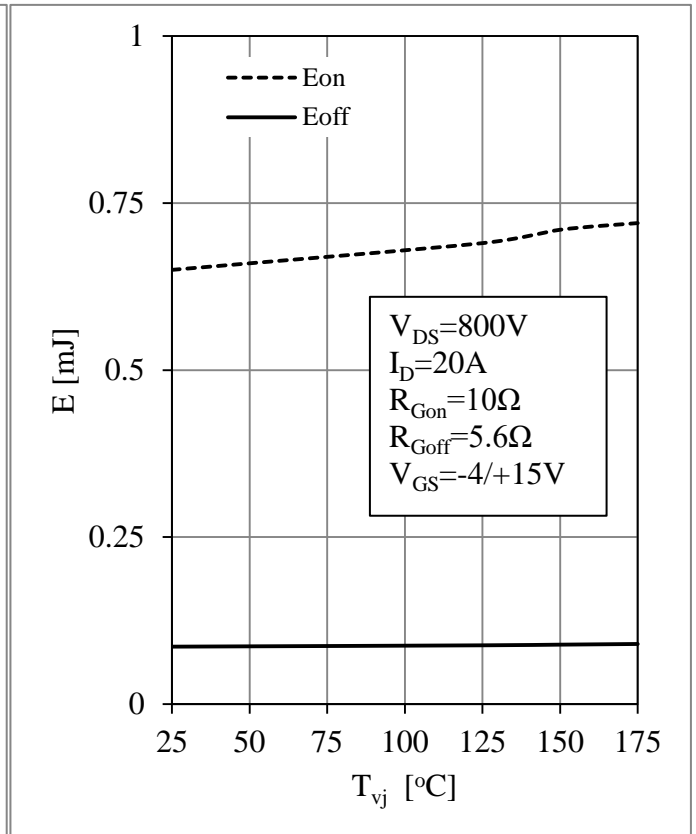


Fig 10. Switching Energy Loss vs.  $T_{vj}$

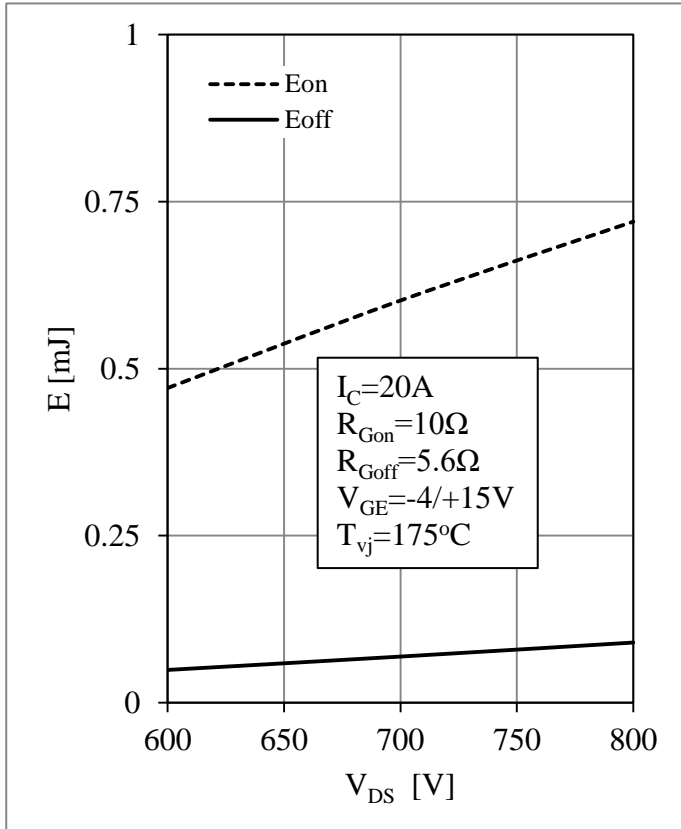


Fig 11. Switching Energy Loss vs.  $V_{DS}$

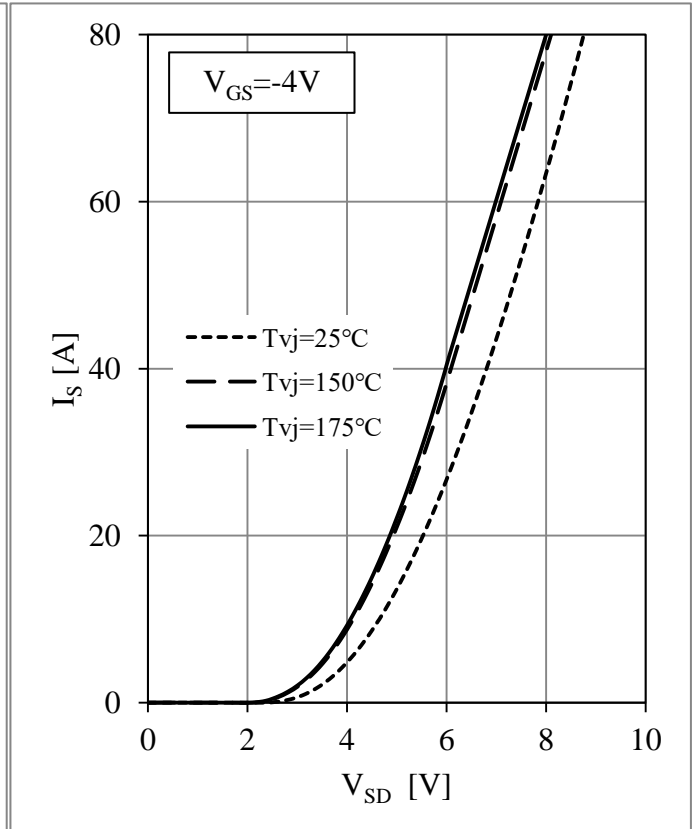


Fig 12. Body Diode Characteristics





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