

# DOSEMI

## SiC MOSFET

### DM400S12EBRB

1200V/40mΩ 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.

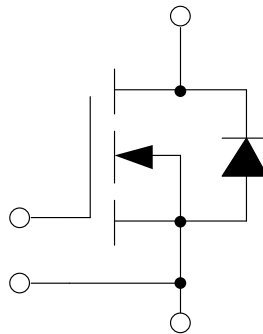
#### Features

- 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
DM400S12EBRB	TO-263-7L	DM400S12EBRB	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 @ $T_{vj}=175^{\circ}\text{C}$	73	A
$P_D$	Maximum Power Dissipation @ $T_{vj}=175^{\circ}\text{C}$	294	W

**Body Diode**

Symbol	Description	Value	Unit
$I_F$	Source Current @ $T_{vj}=175^{\circ}\text{C}$	62	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	$I_D=34\text{A}, V_{GS}=15\text{V}, T_{vj}=25^\circ\text{C}$		40.0		m $\Omega$
		$I_D=34\text{A}, V_{GS}=15\text{V}, T_{vj}=150^\circ\text{C}$		50.5		
		$I_D=34\text{A}, V_{GS}=15\text{V}, T_{vj}=175^\circ\text{C}$		55.2		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=8.7\text{mA}, V_{DS}=V_{GS}, T_{vj}=25^\circ\text{C}$		2.75		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			2.05		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=800\text{V}, f=100\text{kHz}$		3.13		nF
$C_{oss}$	Output Capacitance			116		pF
$C_{rss}$	Reverse Transfer Capacitance			6.83		pF
$Q_g$	Total Gate Charge	$I_D=34\text{A}, V_{DS}=800\text{V}, V_{GS}=-4/+15\text{V}$		86.6		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=34\text{A}, R_G=5.1\Omega, L_S=40\text{nH}, V_{GS}=-4/+15\text{V}, T_{vj}=25^\circ\text{C}$		23		ns
$t_r$	Rise Time			9		ns
$t_{d(off)}$	Turn-Off Delay Time			34		ns
$t_f$	Fall Time			31		ns
$E_{on}$	Turn-On Switching Loss	$V_{GS}=-4/+15\text{V}, T_{vj}=25^\circ\text{C}$		0.41		mJ
$E_{off}$	Turn-Off Switching Loss			0.34		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=34\text{A}, R_G=5.1\Omega, L_S=40\text{nH}, V_{GS}=-4/+15\text{V}, T_{vj}=150^\circ\text{C}$		22		ns
$t_r$	Rise Time			9		ns
$t_{d(off)}$	Turn-Off Delay Time			38		ns
$t_f$	Fall Time			30		ns
$E_{on}$	Turn-On Switching Loss			0.42		mJ
$E_{off}$	Turn-Off Switching Loss			0.35		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=34\text{A}, R_G=5.1\Omega, L_S=40\text{nH}, V_{GS}=-4/+15\text{V}, T_{vj}=175^\circ\text{C}$		22		ns
$t_r$	Rise Time			9		ns
$t_{d(off)}$	Turn-Off Delay Time			39		ns
$t_f$	Fall Time			30		ns
$E_{on}$	Turn-On Switching Loss			0.43		mJ
$E_{off}$	Turn-Off Switching Loss			0.35		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	$I_S=16\text{A}, V_{GS}=-4\text{V}, T_{vj}=25^\circ\text{C}$		4.35		V
		$I_S=16\text{A}, V_{GS}=-4\text{V}, T_{vj}=175^\circ\text{C}$		3.85		

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

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{thJC}$	Junction-to-Case (per Mosfet)		0.390	0.510	K/W

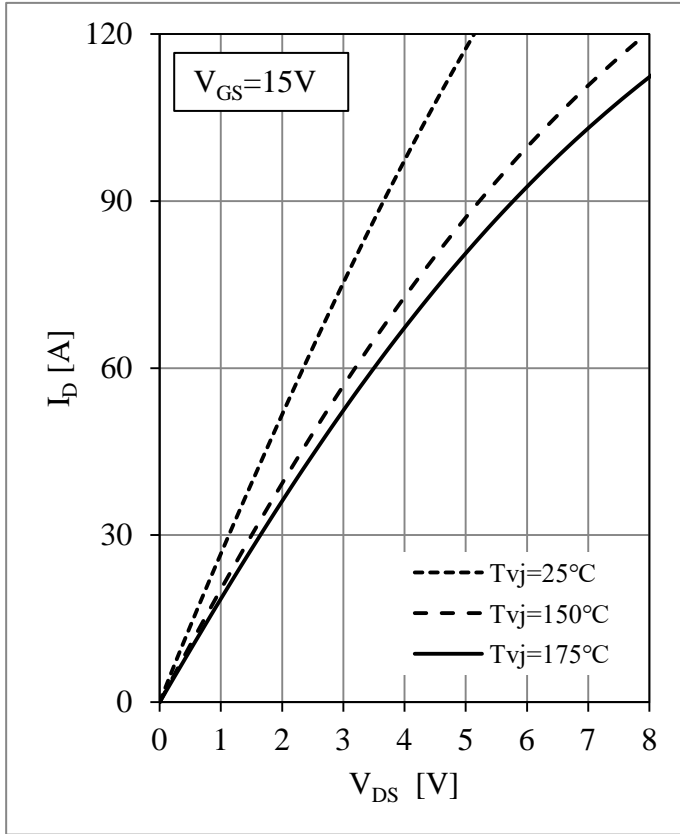


Fig 1. MOSFET Output Characteristics

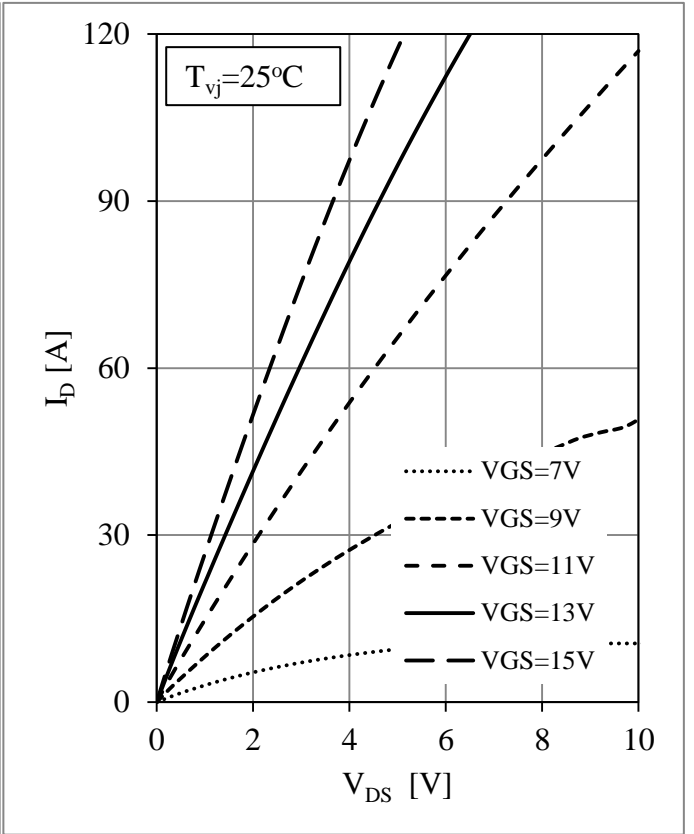


Fig 2. MOSFET Output Characteristics

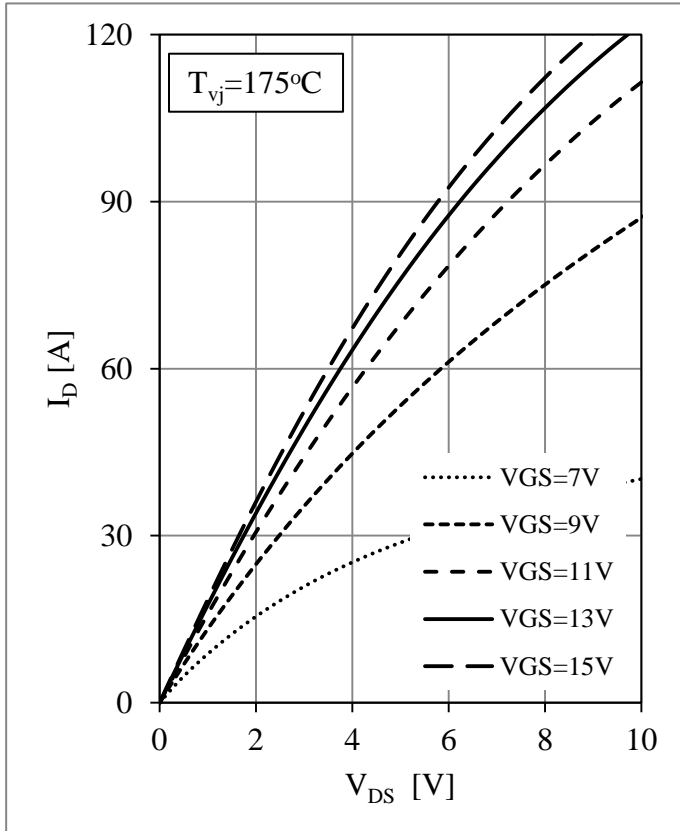


Fig 3. MOSFET Output Characteristics

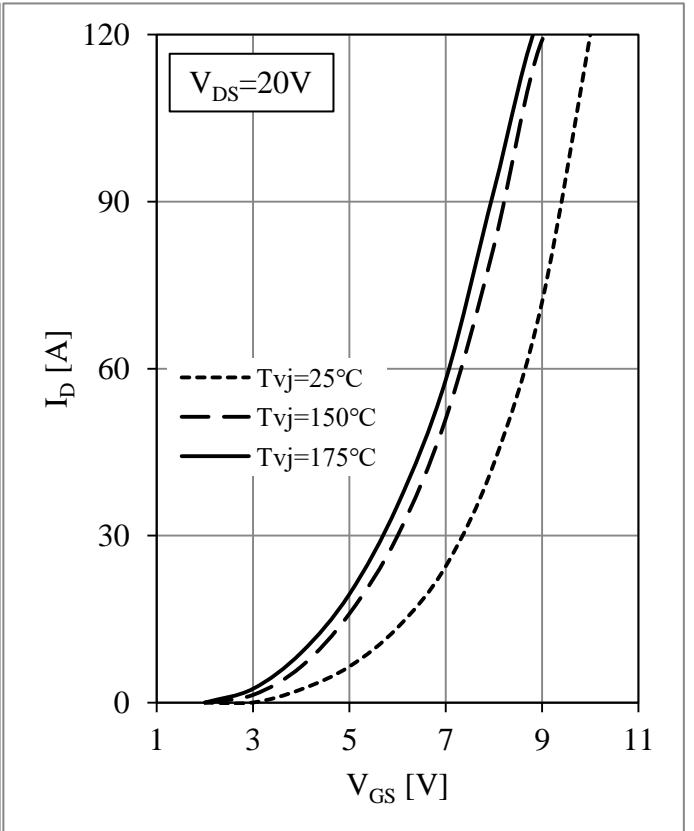


Fig 4. MOSFET Transfer Characteristics

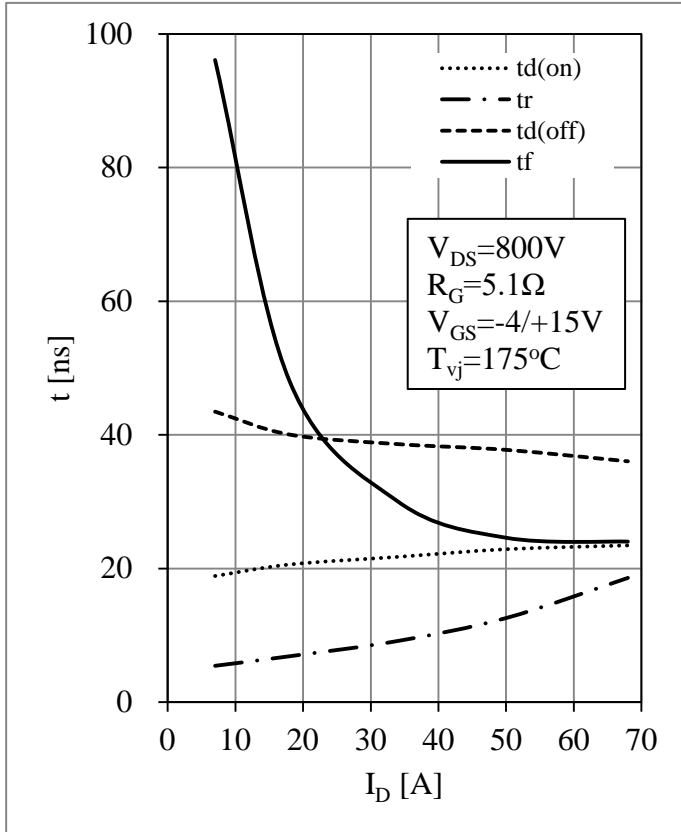


Fig 5. MOSFET Switching Times as.  $I_{D_S}$

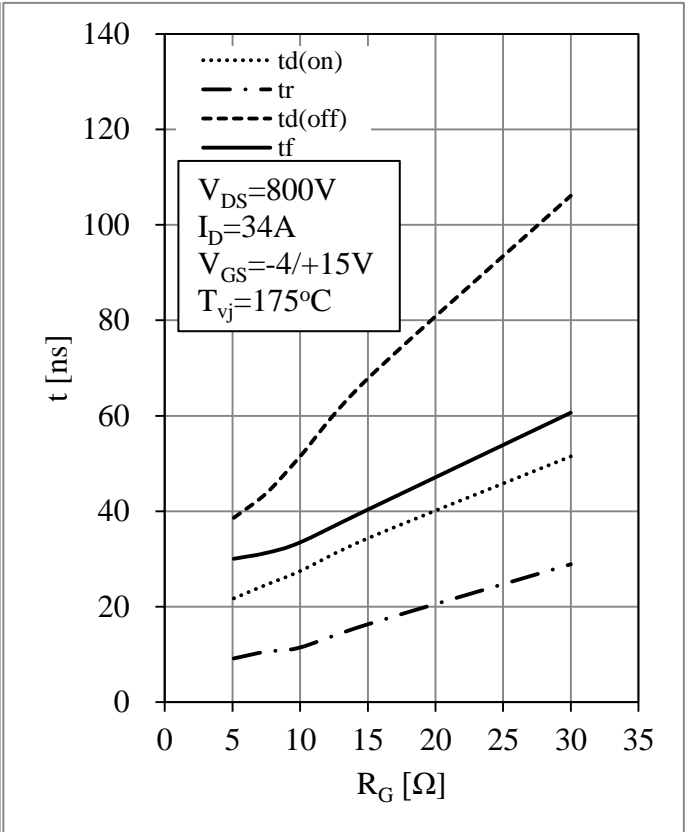


Fig 6. MOSFET Switching Times as.  $R_G$

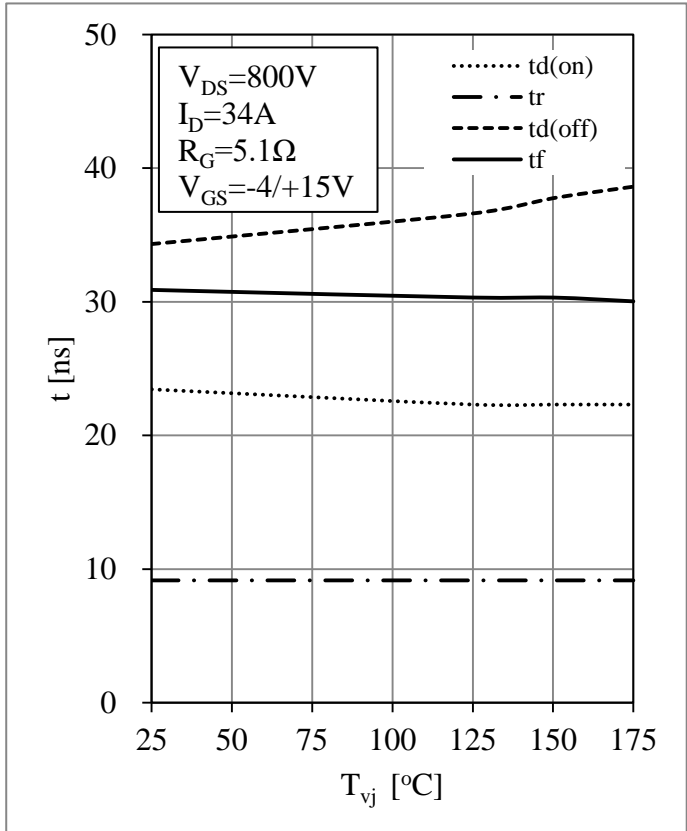


Fig 7. MOSFET Switching Times vs.  $T_{vj}$

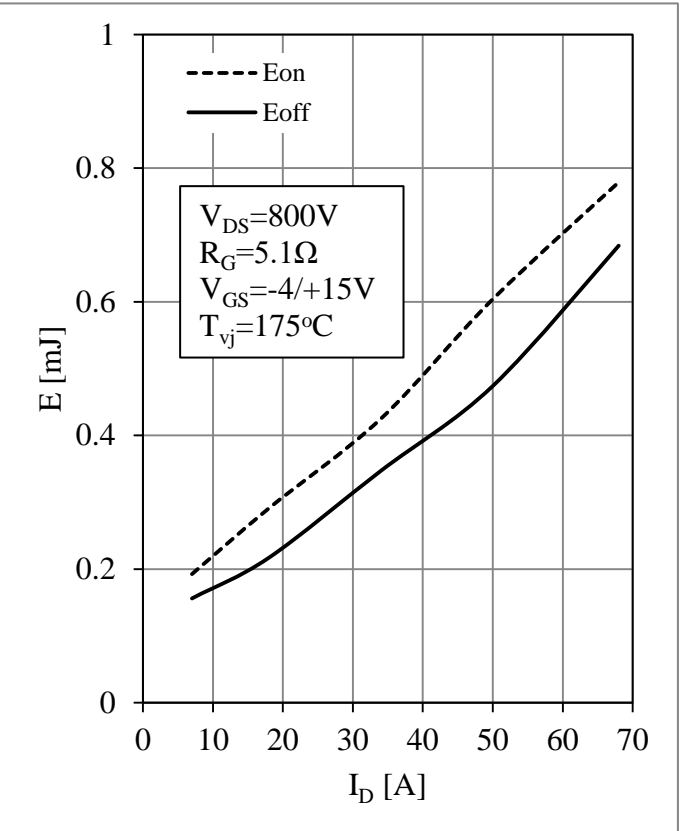


Fig 8. Switching Energy Loss vs.  $I_{D_S}$

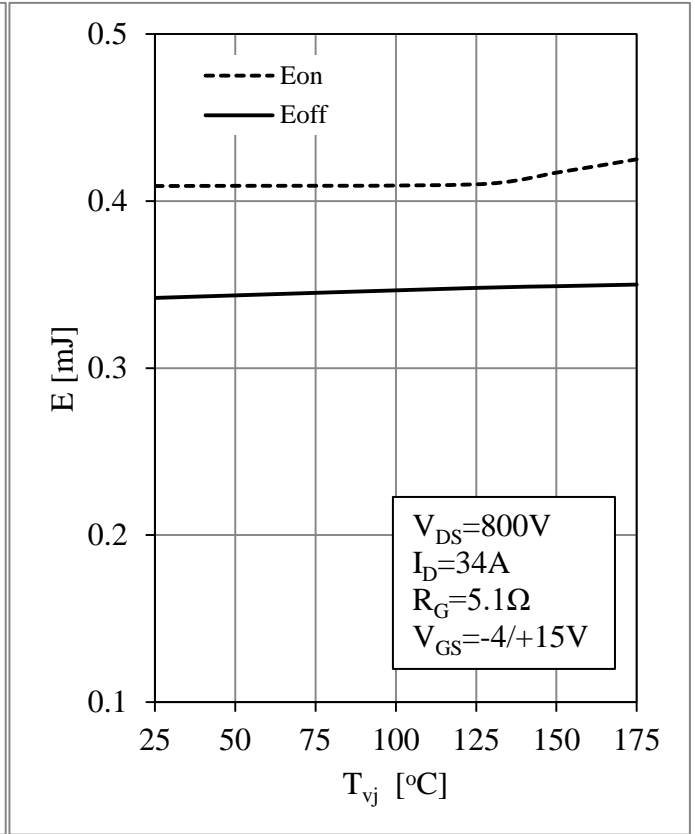
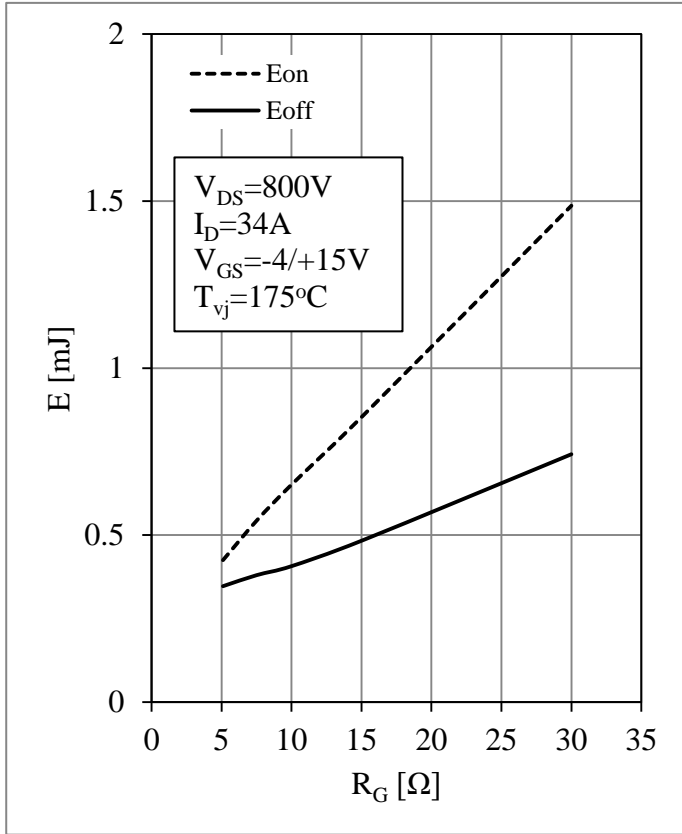


Fig 9. Switching Energy Loss vs.  $R_G$

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

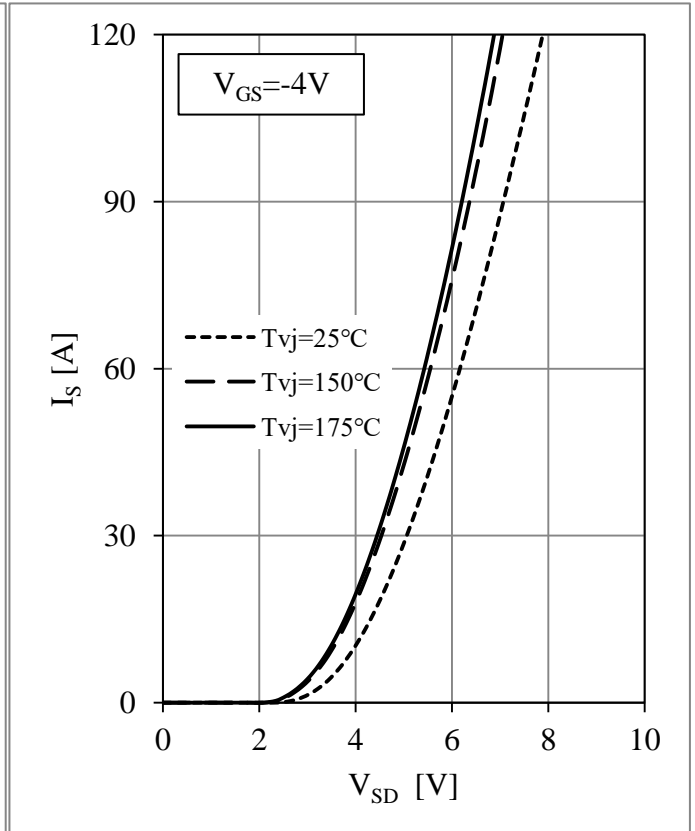
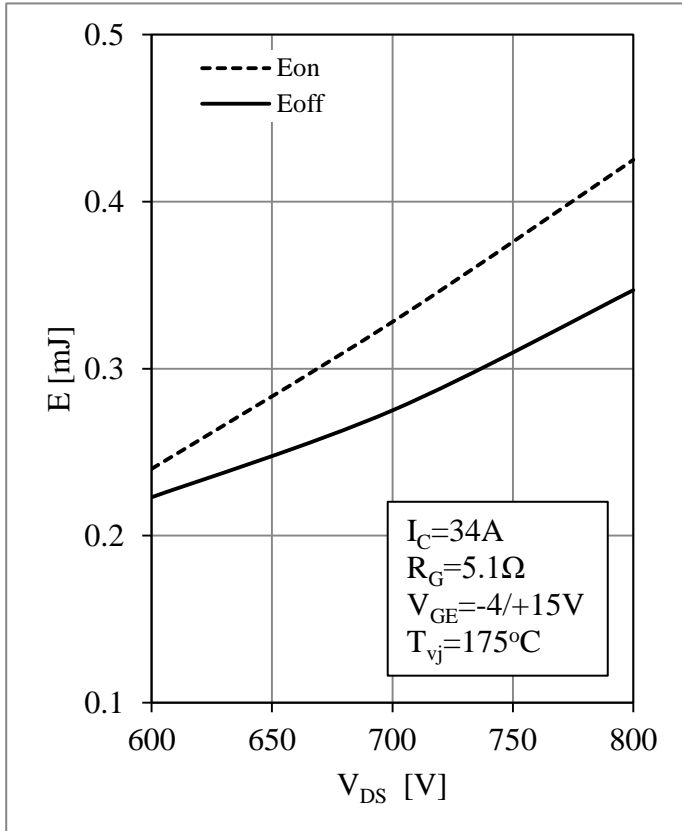
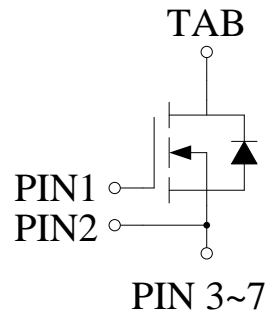


Fig 11. Switching Energy Loss vs.  $V_{DS}$

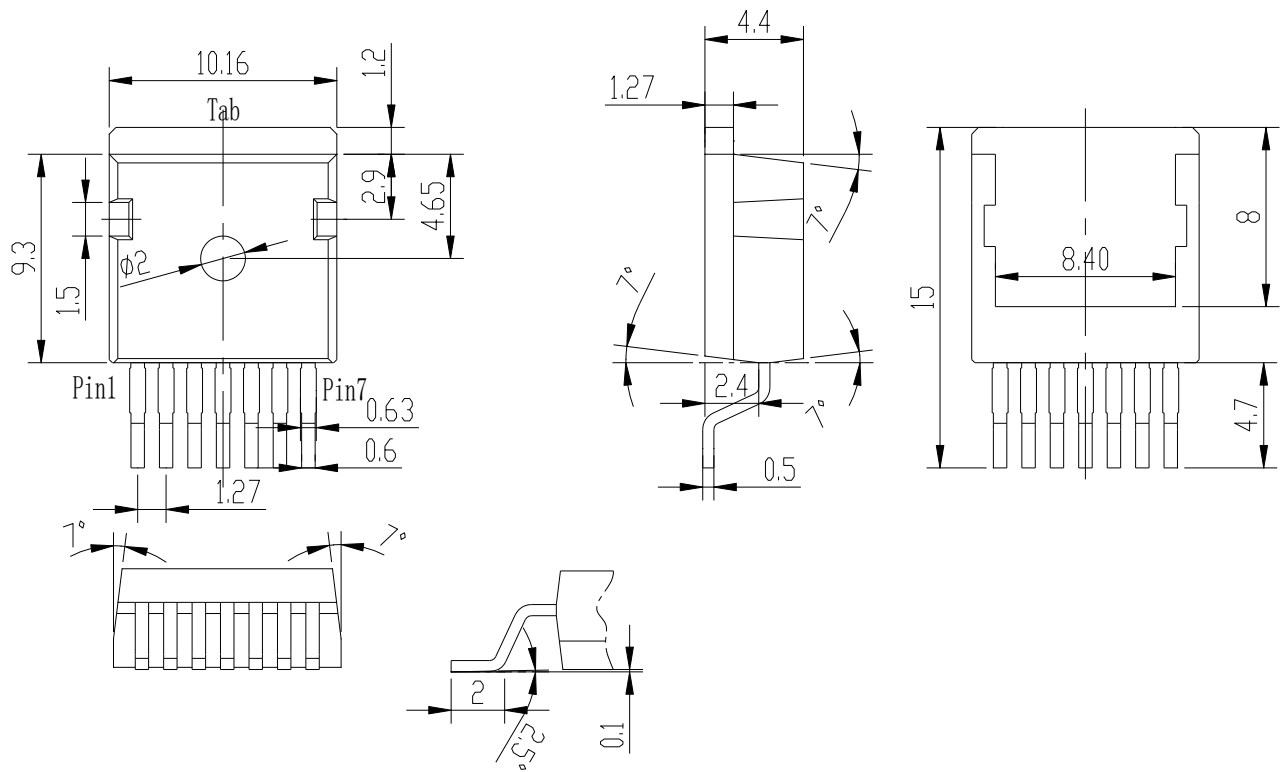
Fig 12. Body Diode Characteristics

### Circuit Schematic



### Package Dimensions

Dimensions in Millimeters





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