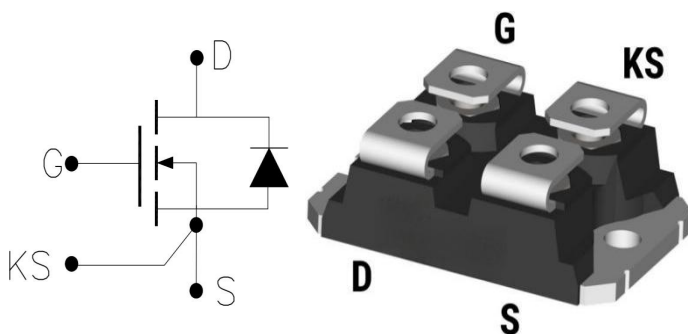


Single Unit SiC MOSFET Module

Parameter	Value	Unit
V_{DS}	1200	V
I_D	210	A
$R_{DS(ON)}$	9	mΩ



Features:

- Low Switching Losses
- 175°C Maximum Junction Temperature
- Faster and More Efficient Switching

Applications:

- UPS
- Motor Drive
- EV Charging
- High Voltage DC-DC Converters
- Induction Heating and Welding
- Smart Grid Transmission and Distribution

Maximum Ratings ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Drain-source Voltage	V_{DS}	$V_{GS}=0V$	1200	V
Gate-source Voltage	V_{GS}	$V_{DS}=0V$; AC frequency $\geq 1\text{Hz}$; (Note1)	-10/+22	V
Drain Current (continuous)	I_D	$T_C=25^\circ\text{C}$; $V_{GS}=-+15V$	200	A
		$T_C=100^\circ\text{C}$; $V_{GS}=-+15V$	140	
Drain Current (continuous)	I_D	$T_C=25^\circ\text{C}$; $V_{GS}=-+18V$	210	A
		$T_C=100^\circ\text{C}$; $V_{GS}=-+18V$	150	
Drain Current (pulsed)	I_{DM}	Pulse width $\leq 3\mu\text{s}$; $V_{GS}=+15V$; (Note2)	600	A
Total Power Dissipation	P_{tot}	$T_C=25^\circ\text{C}$	484	W
Storage Temperature Range	T_{stg}	-	-40 to +175	$^\circ\text{C}$
Junction Temperature	T_J	-	-40 to +175	

Note1: Recommended Operating Value, +18V/-5V, +15V/-4V

Note2: Pulse width limited by maximum junction temperature

MOSFET Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified, chip)

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Static characteristics (at T _C =25°C unless otherwise specified)							
Drain-Source Breakdown Voltage	B _{VDS}	V _{GS} =0V; I _D =100uA		1200	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =1200V; V _{GS} =0V		-	2	-	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =22V; V _{DS} =0V	T _J =25°C	-	-	200	nA

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}; I_D=70mA$	$T_J=25^{\circ}C$	1.8	2.7	-	V
			$T_J=175^{\circ}C$	-	2.05	-	
Static Drain-Source on Resistance	$R_{DS(on)}$	$V_{GS}=15V; I_D=120A$	$T_J=25^{\circ}C$	-	10	-	mΩ
			$T_J=175^{\circ}C$	-	14.5	-	
		$V_{GS}=18V; I_D=120A$	$T_J=25^{\circ}C$	-	9	12	
			$T_J=175^{\circ}C$	-	13	-	
Static drain-source On-state Voltage	$V_{DS(on)}$	$V_{GS}=15V; I_D=120A$	$T_J=25^{\circ}C$	-	1.20	-	V
			$T_J=175^{\circ}C$	-	1.74	-	
		$V_{GS}=18V; I_D=120A$	$T_J=25^{\circ}C$	-	1.08	1.44	
			$T_J=175^{\circ}C$	-	1.56	-	
Internal gate resistor	R_{Gint}	-	$T_J=25^{\circ}C$	-	0.65	-	Ω
Dynamic characteristics (at $T_C=25^{\circ}C$ unless otherwise specified)							
Input Capacitance	C_{iss}	$V_{DS}=800V; V_{GS}=0V;$ $f=1MHz; V_{AC}=25mV$		-	3192	-	pF
Output Capacitance	C_{oss}			-	132	-	
Reverse Transfer Capacitance	C_{rss}			-	7	-	
Turn-on Energy	E_{on}	$V_{GS}=-4/+15V; I_D=120A;$ $V_{DD}=800V; R_{g(ext)}=1.0\Omega;$ Inductive load switching operation	$T_J=25^{\circ}C$	-	976	-	uJ
			$T_J=150^{\circ}C$	-	1324	-	
Turn-off Energy	E_{off}		$T_J=25^{\circ}C$	-	410	-	
			$T_J=150^{\circ}C$	-	400	-	
Gate-Source Charge	Q_G	$V_{DD}=800V; V_{GS}=-5/+15V; I_D=120A$		-	117	-	nC
Turn-on Delay Time	$t_{d(on)}$	$V_{GS}=-4/+15V; I_D=120A;$ $V_{DD}=800V; R_{g(ext)}=1.0\Omega;$ Inductive load switching operation	$T_J=25^{\circ}C$	-	48	-	ns
			$T_J=150^{\circ}C$	-	41	-	
Rise Time	t_r		$T_J=25^{\circ}C$	-	21	-	
			$T_J=150^{\circ}C$	-	17	-	
Turn-off Delay Time	$t_{d(off)}$		$T_J=25^{\circ}C$	-	23	-	
			$T_J=150^{\circ}C$	-	27	-	
Fall Time	t_f		$T_J=25^{\circ}C$	-	14	-	
			$T_J=150^{\circ}C$	-	48	-	
FET Thermal Resistance	$R_{th(j-c)}$	Junction to Case		-	0.31	0.45	K/W

Body Diode Electrical Characteristics ($T_J=25^{\circ}C$ unless otherwise specified, chip: Target)

Parameter	Symbol	Conditions		Values			Units
				Min.	Typ.	Max.	
Forward Voltage	V _{FSD}	V _{GS} =-5V; I _F =60A	T _J =25°C	-	4.3	-	V
			T _J =175°C	-	3.8	-	
Reverse Recovery Current	I _{rrm}	V _{GS} =-4/+15V; I _F =120A; V _{DD} =800V; R _{g(ext)} =1.0Ω; Inductive load switching operation	T _J =25°C	-	28	-	A
			T _J =150°C	-	42	-	
Reverse Recovery Time	t _{RR}		T _J =25°C	-	38	-	ns
			T _J =150°C	-	49	-	
Reverse Recovery Charge	Q _{RR}		T _J =25°C	-	245	-	uC
			T _J =150°C	-	480	-	

Module Characteristics

Parameter	Symbol	Conditions	Values	Units
Isolation Test Voltage	V_{ISOL}	RMS; $f=50\text{Hz}$; $t=1\text{min}$	3.4	kV
CTI	-	-	>200	
Terminal Connection Torque	M	M4	1.5	Nm
Weight	W	-	28	g

Typical Characteristics

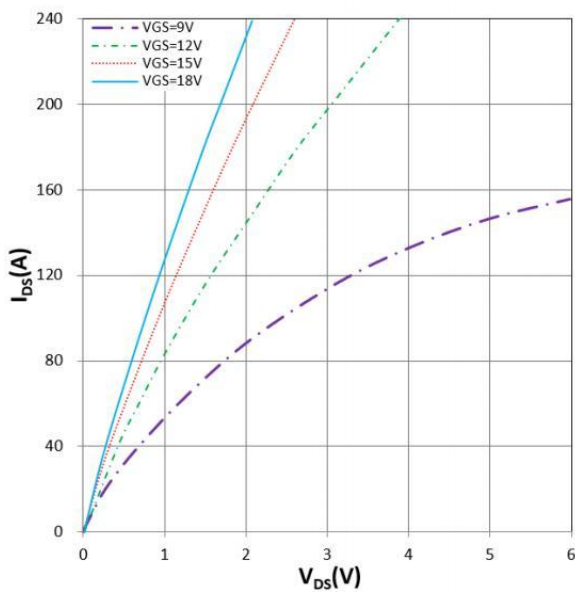


Figure 1 . I_{DS} vs V_{DS}
 $T_J = 25^\circ\text{C}$

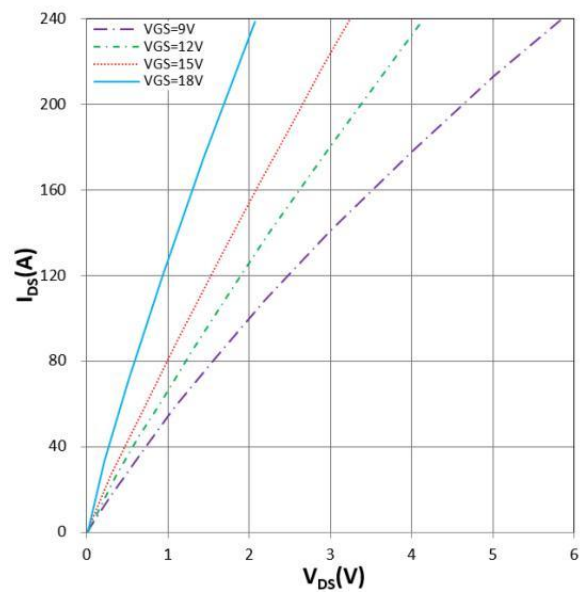


Figure 2. I_{DS} vs V_{DS}
 $T_J = 175^\circ\text{C}$

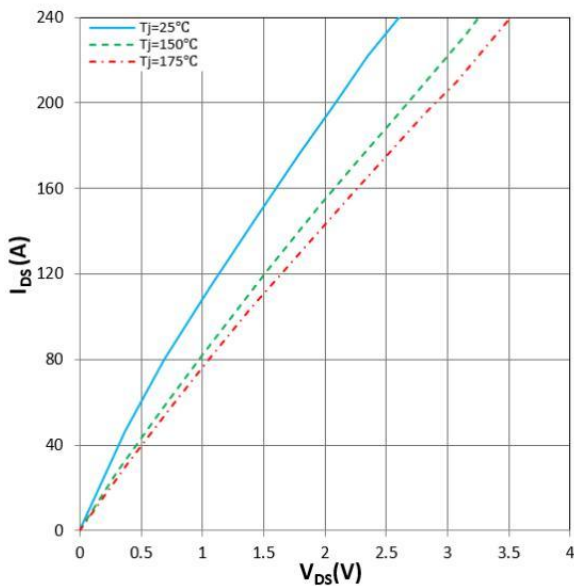


Figure 3 . I_{DS} vs V_{DS}
 $V_{GS} = +15\text{V}$

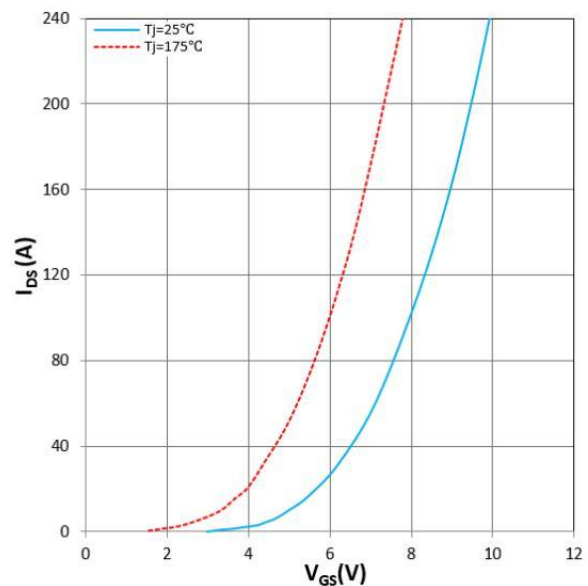


Figure 4 . I_{DS} vs V_{GS}
 $V_{DS} = +10\text{V}$

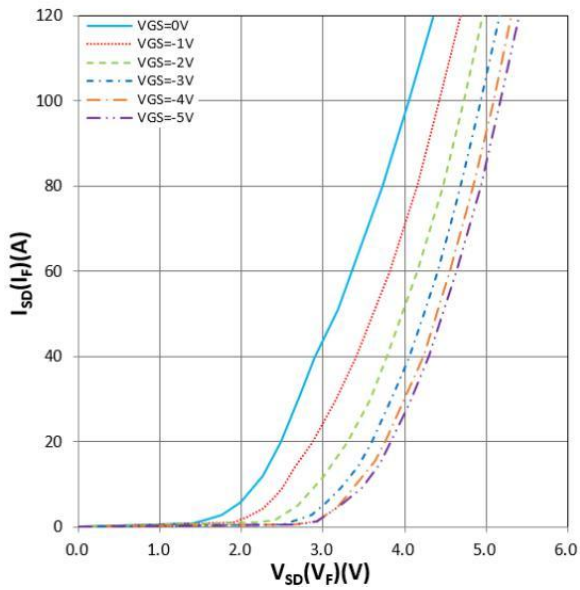


Figure 5 . I_D vs V_{SD} (V)
 $T_j = 25^\circ\text{C}$

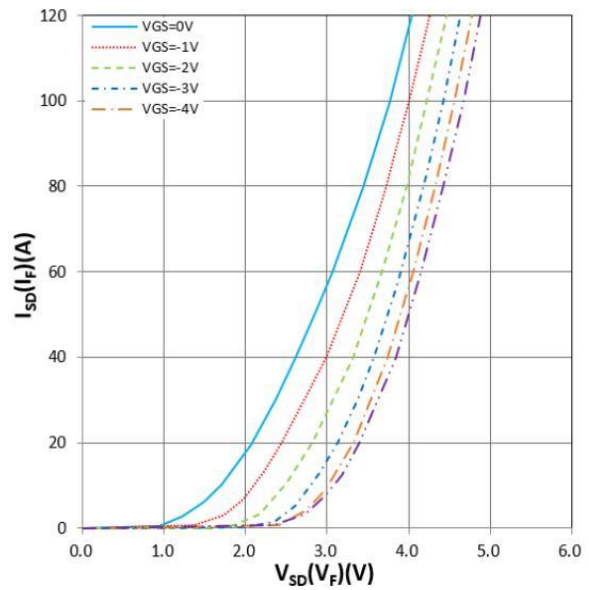


Figure 6 . I_D vs V_{SD} (V)
 $T_j = 175^\circ\text{C}$

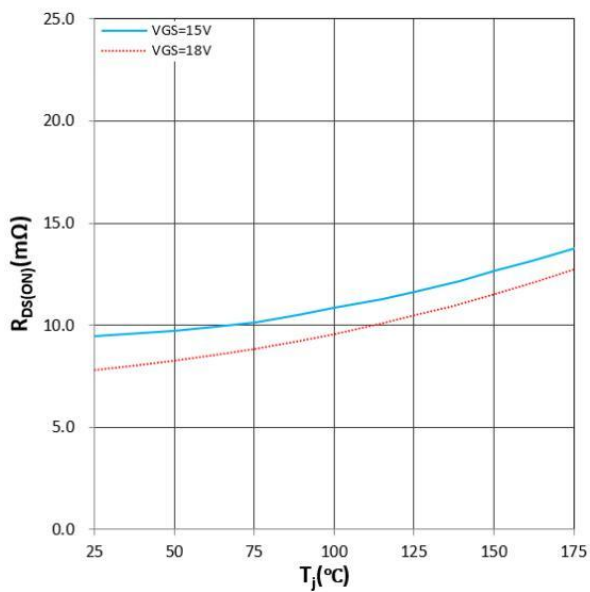


Figure 7 . $R_{DS(ON)}$ vs T_j
 $I_D = 120\text{A}$

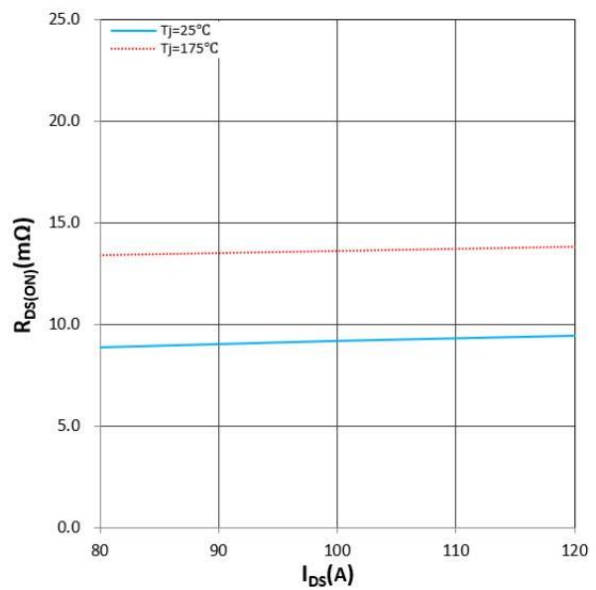


Figure 8 . $R_{DS(ON)}$ vs I_{DS}
 $V_{GS} = +15\text{V}$

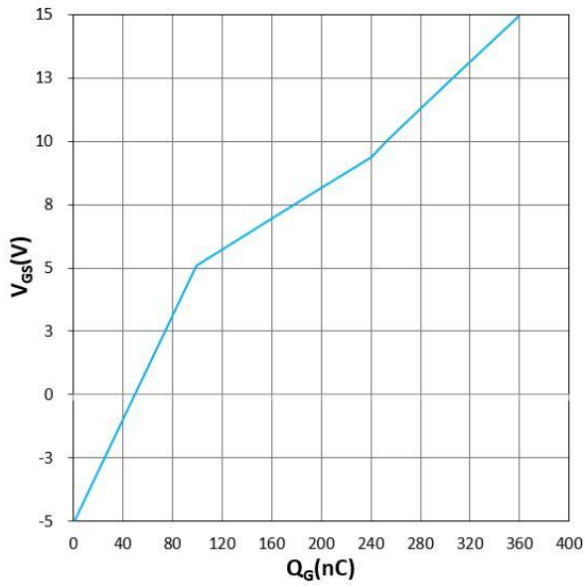


Figure 9 . V_{GS} vs Q_g

$V_{DS}=800V$, $I_D=120A$, $T_j=25^\circ C$

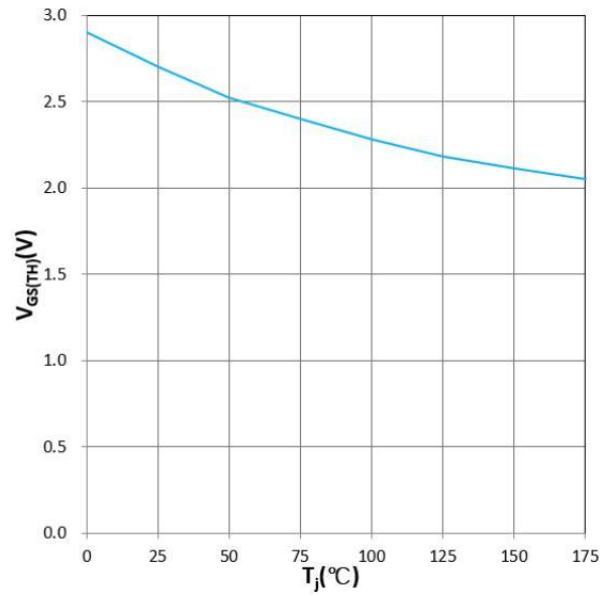


Figure 10. $V_{GS(TH)}$ vs T_j

$V_{GS}=V_{DS}$, $I_D=70mA$

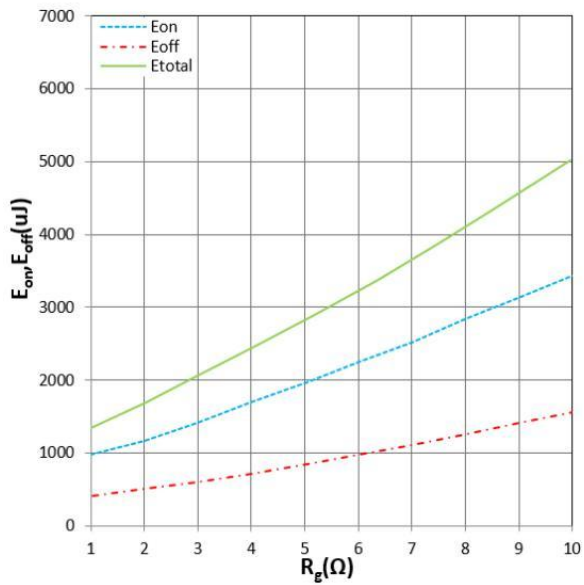


Figure 11. E_{on} , E_{off} vs R_g

$T_j=25^\circ C$, $V_{CC}=800V$, $V_{GS}=+15V/-4V$, $I_D=120A$

Inductive Load

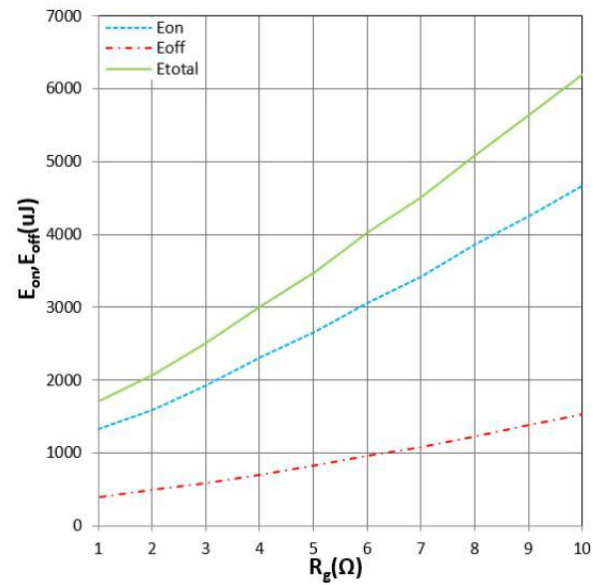


Figure 12. E_{on} , E_{off} vs R_g

$T_j=150^\circ C$, $V_{CC}=800V$, $V_{GS}=+15V/-4V$, $I_D=120A$

Inductive Load

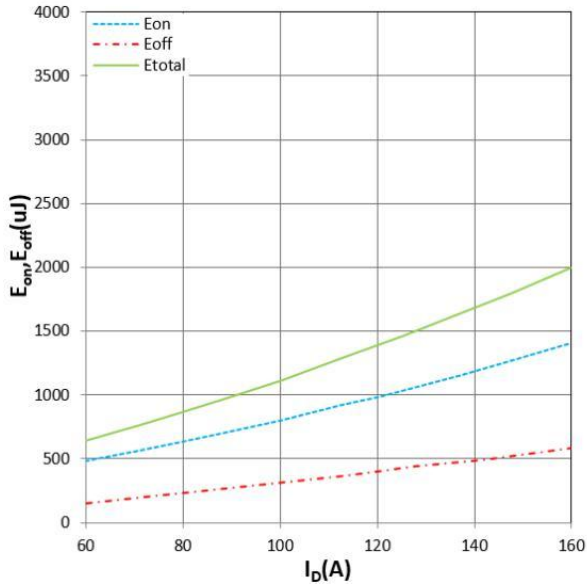


Figure 13. E_{on} , E_{off} vs I_D
 $T_j = 25^\circ\text{C}$, $V_{CC} = 800\text{V}$, $V_{GS} = +15\text{V}/-4\text{V}$
 $R_{gon} = R_{goff} = 1.0\Omega$, Inductive Load

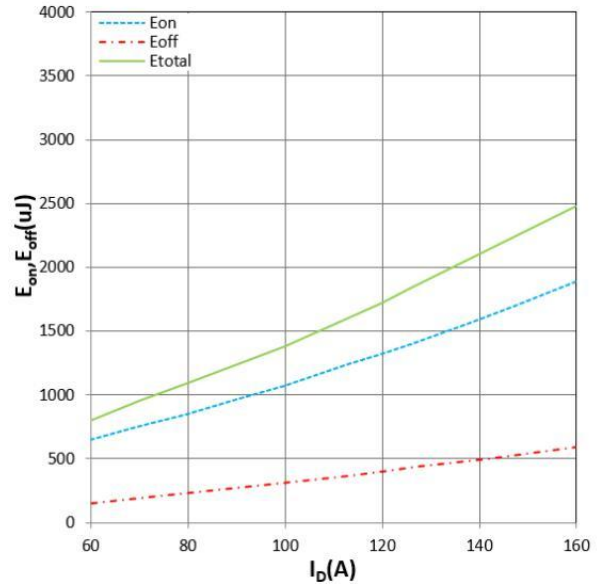


Figure 14. E_{on} , E_{off} vs I_D
 $T_j = 150^\circ\text{C}$, $V_{CC} = 800\text{V}$, $V_{GS} = +15\text{V}/-4\text{V}$
 $R_{gon} = R_{goff} = 1.0\Omega$, Inductive Load

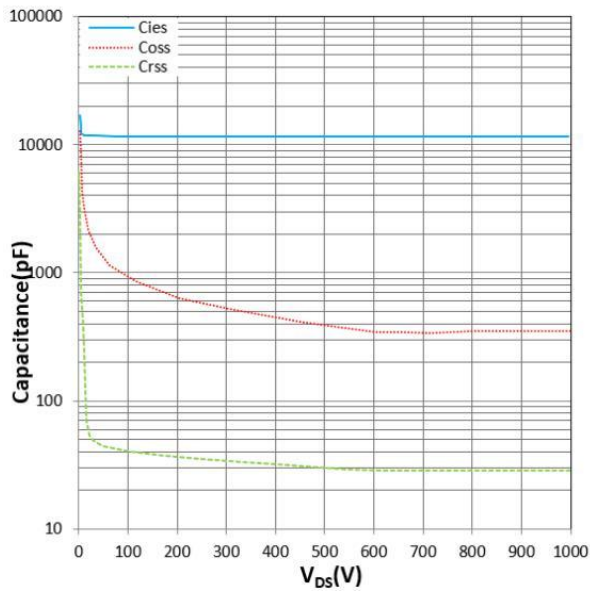
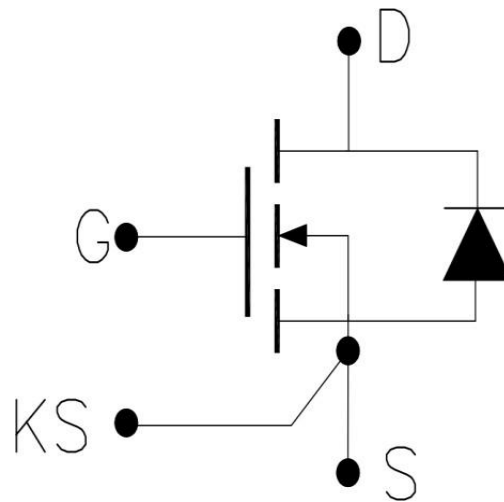


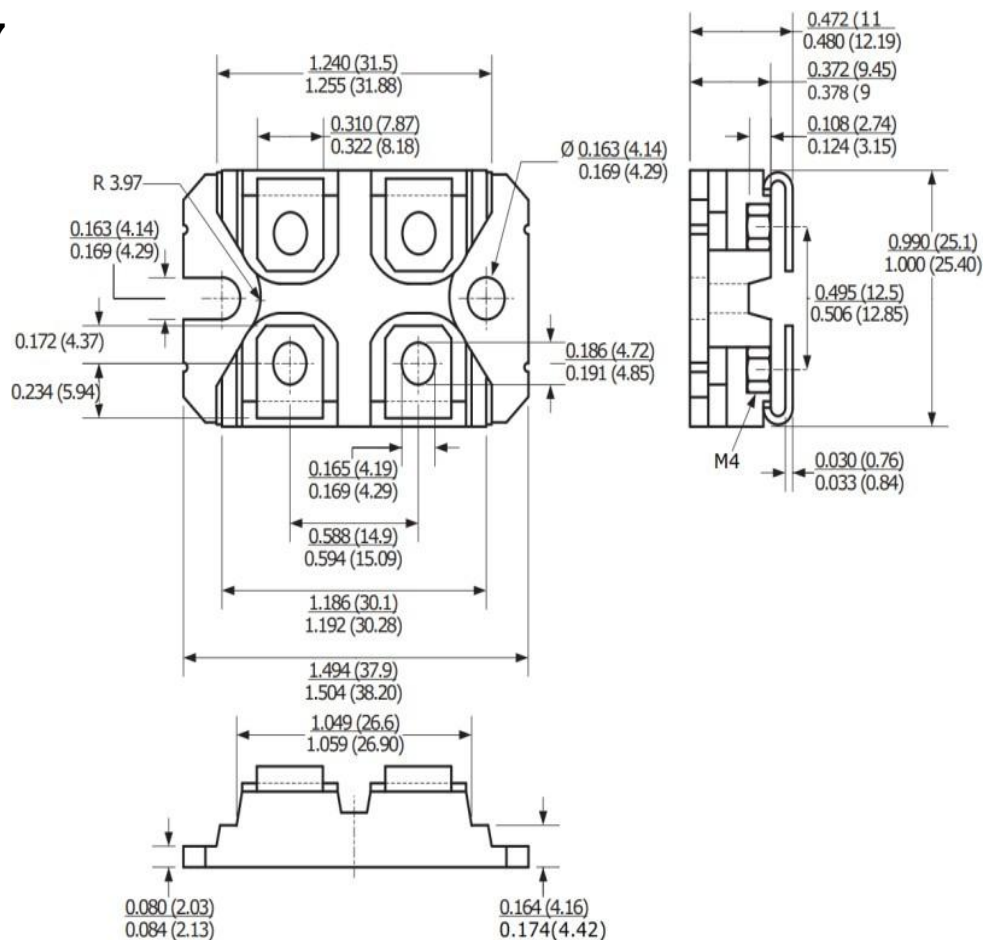
Figure 15. C_{iss} , C_{oss} , C_{rss} vs V_{DS}
 $T_j = 25^\circ\text{C}$, $f = 1\text{MHz}$, $V_{AC} = 25\text{mV}$

Circuit Diagram



Package Outline (Unit: mm):

SOT-227



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