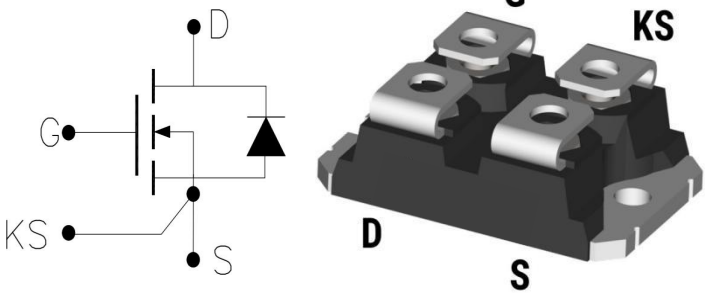
Single Unit SiC MOSFET Module

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 (Tj =25°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 ≥1Hz; (Note1)	-10/+22	V
Drain Current (continuous)	I_D	T_C=25°C; V_{GS} =-+15V	200	A
		T_C=100°C; V_{GS} =-+15V	140	
Drain Current (continuous)	I_D	T_C=25°C; V_{GS} =-+18V	210	
		T_C=100°C; V_{GS} =-+18V	150	
Drain Current (pulsed)	I_{DM}	Pulse width≤3μs; V_{GS} =+15V; (Note2)	600	A
Total Power Dissipation	P_{tot}	T_C=25°C	484	W
Storage Temperature Range	T_{stg}	-	-40 to +175	°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 (Tj =25°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°C	1.8	2.7	-	V

			T_J=175°C	-	2.05	-	
Static Drain-Source on Resistance	$R_{DS(on)}$	V_{GS}=15V; I_D=120A	T_J=25°C	-	10	-	mΩ
			T_J=175°C	-	14.5	-	
		V_{GS}=18V; I_D=120A	T_J=25°C	-	9	12	
			T_J=175°C	-	13	-	
Static drain-source On-state Voltage	$V_{DS(on)}$	V_{GS}=15V; I_D=120A	T_J=25°C	-	1.20	-	V
			T_J=175°C	-	1.74	-	
		V_{GS}=18V; I_D=120A	T_J=25°C	-	1.08	1.44	
			T_J=175°C	-	1.56	-	
Internal gate resistor	R_{Gint}	-	T_J=25°C	-	0.65	-	Ω
Dynamic characteristics (at T_C=25°Cunless 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; $R_{g(ext)}$=1.0Ω; Inductive load switching operation	T_J=25°C	-	976	-	uJ
			T_J=150°C	-	1324	-	
Turn-off Energy	E_{off}		T_J=25°C	-	410	-	
			T_J=150°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; $R_{g(ext)}$=1.0Ω; Inductive load switching operation	T_J=25°C	-	48	-	ns
			T_J=150°C	-	41	-	
Rise Time	t_r		T_J=25°C	-	21	-	
			T_J=150°C	-	17	-	
Turn-off Delay Time	$t_{d(off)}$		T_J=25°C	-	23	-	
			T_J=150°C	-	27	-	
Fall Time	t_f		T_J=25°C	-	14	-	
			T_J=150°C	-	48	-	
FET Thermal Resistance	$R_{th(j-c)}$	Junction to Case		-	0.31	0.45	K/W

Body Diode Electrical Characteristics (Tj =25°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 =50Hz; t=1min	3.4	kV
CTI	-	-	>200	
Terminal Connection Torque	M	M4	1.5	Nm
Weight	W	-	28	g

Typical Characteristics

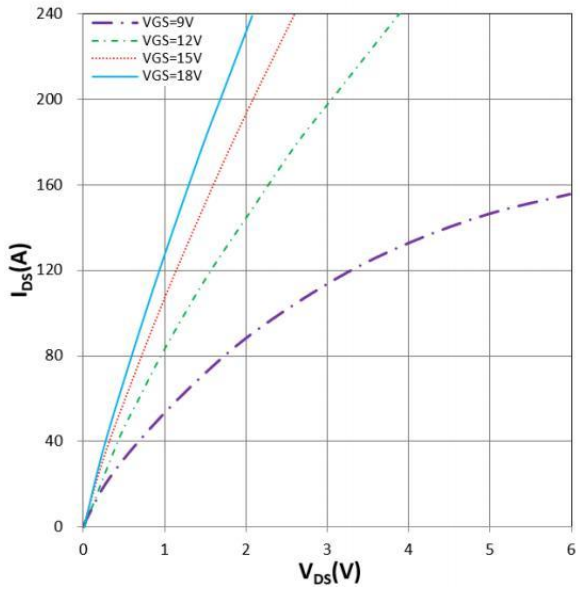


Figure 1 . I_{DS} vs V_{DS}
T_j =25°C

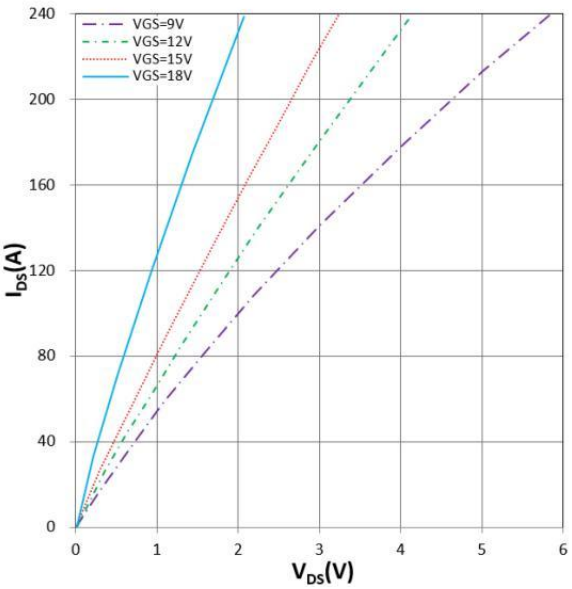


Figure 2. I_{DS} vs V_{DS}
T_j =175°C

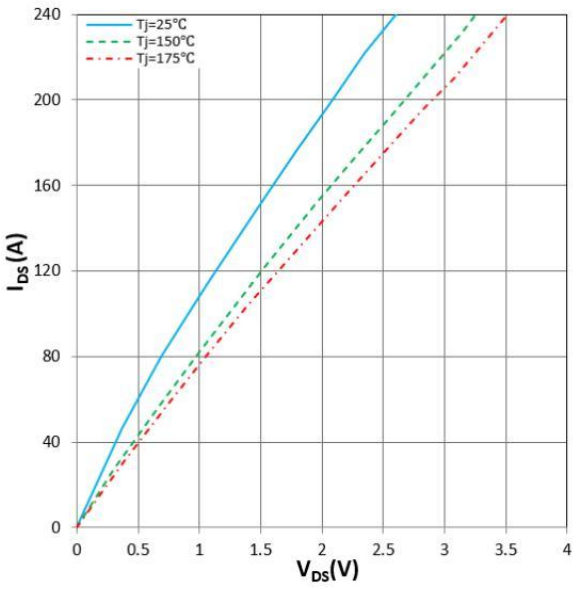


Figure 3 . I_{DS} vs V_{DS}
V_{GS} =+15V

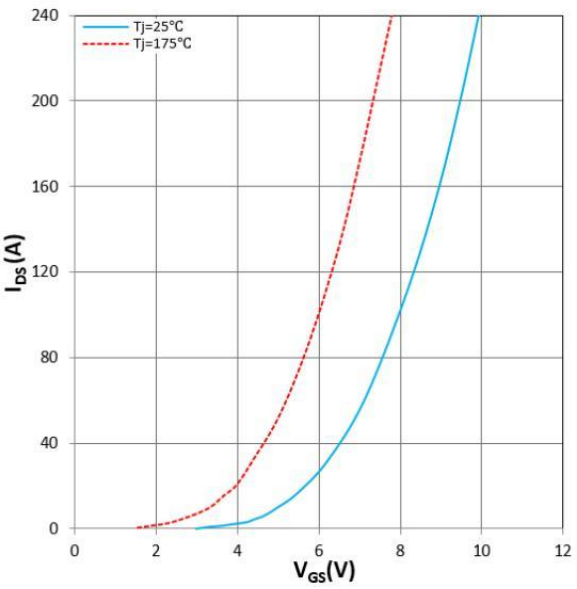


Figure 4 . I_{DS} vs V_{GS}
V_{DS} =+10V

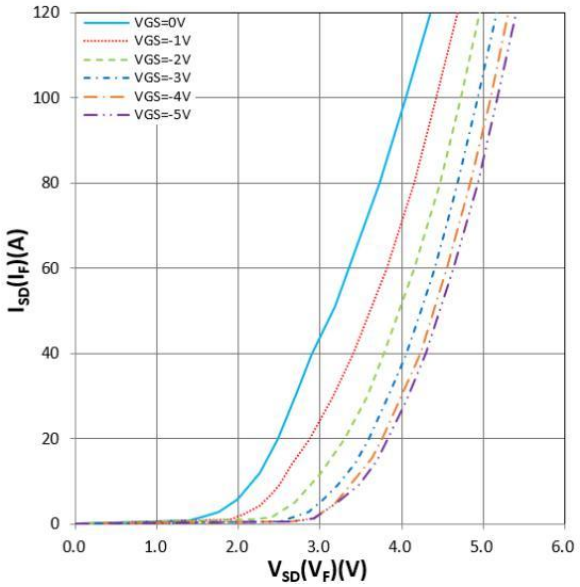


Figure 5 . I_{SD} vs V_{SD} (V_F)

T_j =25°C

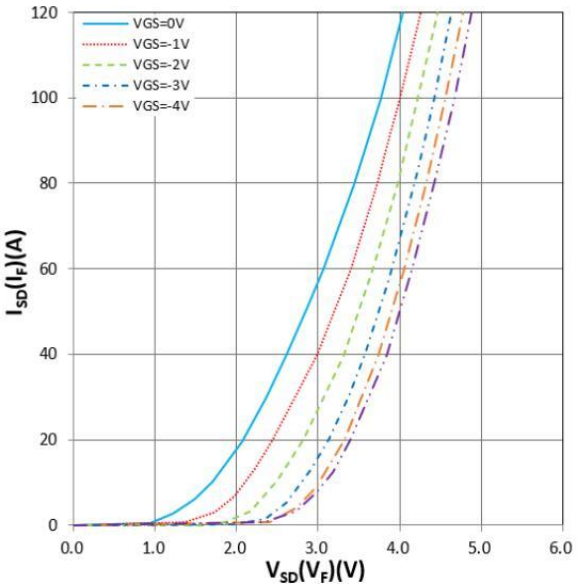


Figure 6 . I_{SD} vs V_{SD} (V_F)

T_j =175°C

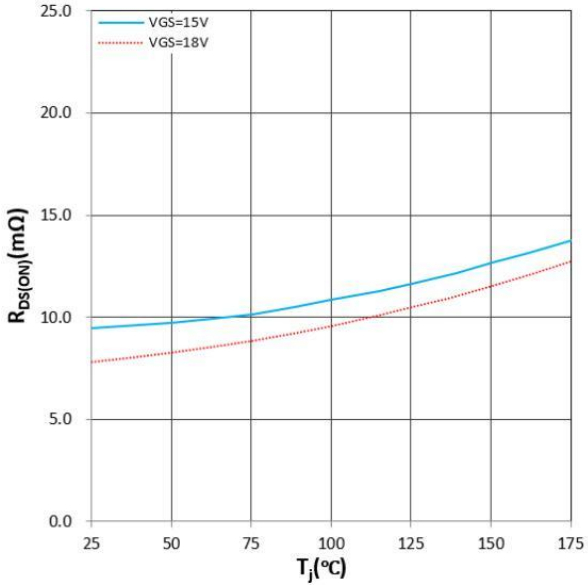


Figure 7 . $R_{DS(ON)}$ vs T_j

I_D =120A

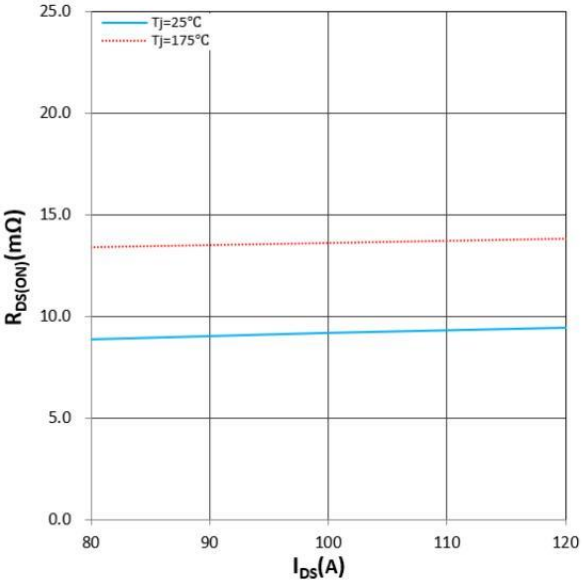


Figure 8 . $R_{DS(ON)}$ vs I_{DS}

V_{GS} =+15V

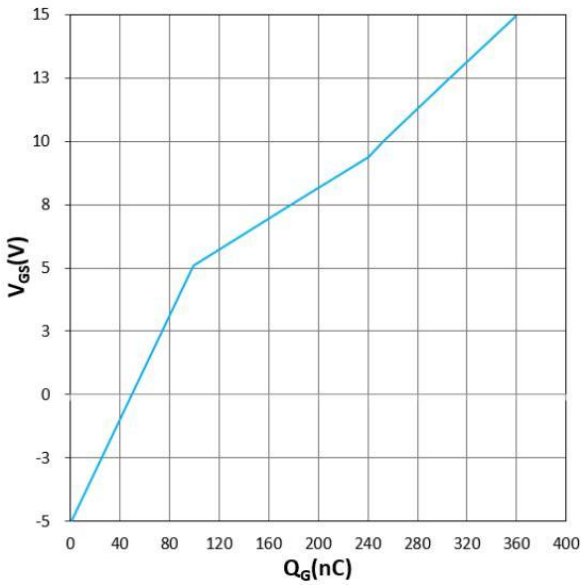


Figure 9 . V_{GS} vs Q_g
V_{DS} =800V, I_D =120A, T_j =25℃

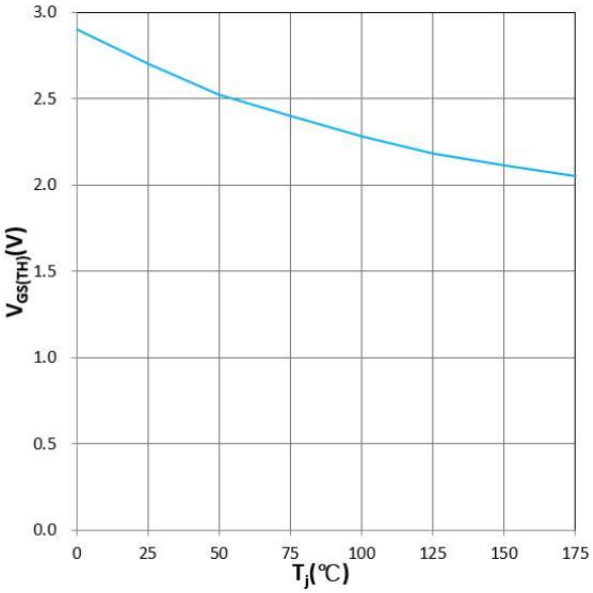


Figure 10. $V_{GS(TH)}$ vs T_j
V_{GS} =V_{DS}, I_D =70mA

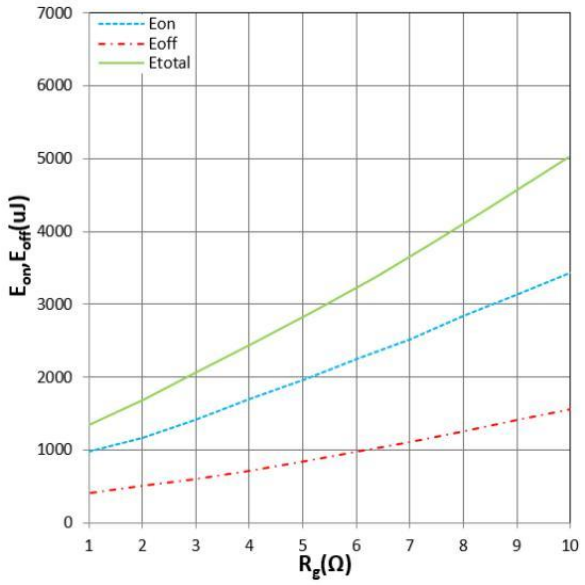


Figure 11. E_{on}, E_{off} vs R_g
T_j=25°C, V_{CC} =800V, V_{GS} =+15V/-4V, I_D =120A
Inductive Load

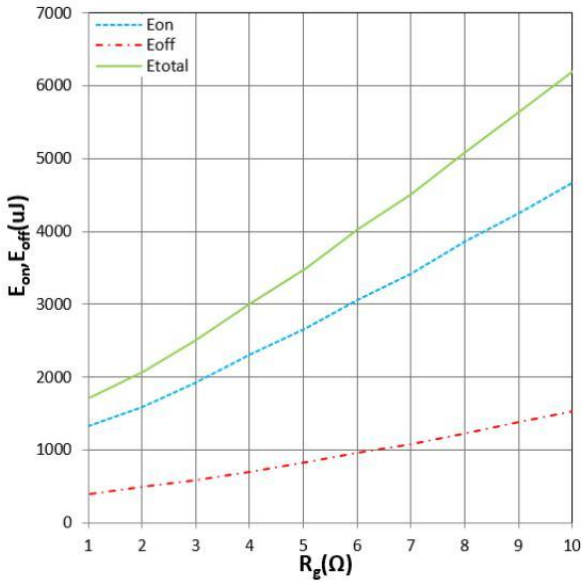


Figure 12. E_{on}, E_{off} vs R_g
T_j=150°C, V_{CC} =800V, V_{GS} =+15V/-4V, I_D =120A
Inductive Load

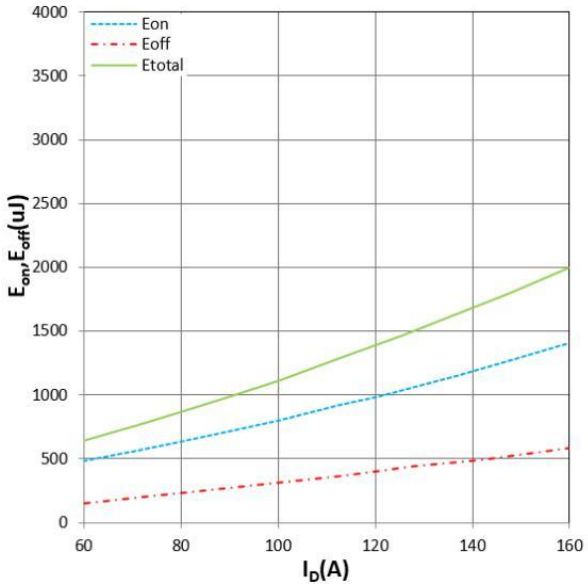


Figure 13. E_{on}, E_{off} vs I_{DS}
T_j=25°C, V_{CC} =800V, V_{GS} =+15V/-4V
R_{gon}=R_{goff} =1.0Ω, Inductive Load

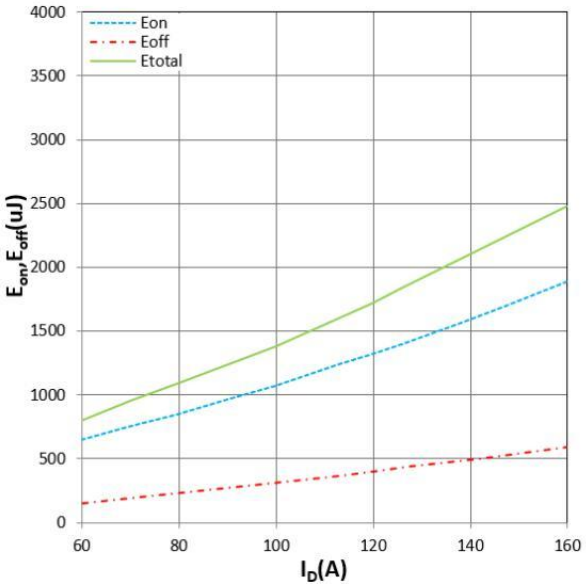


Figure 14. E_{on}, E_{off} vs I_{DS}
T_j=150°C, V_{CC} =800V, V_{GS} =+15V/-4V
R_{gon}=R_{goff} =1.0Ω, Inductive Load

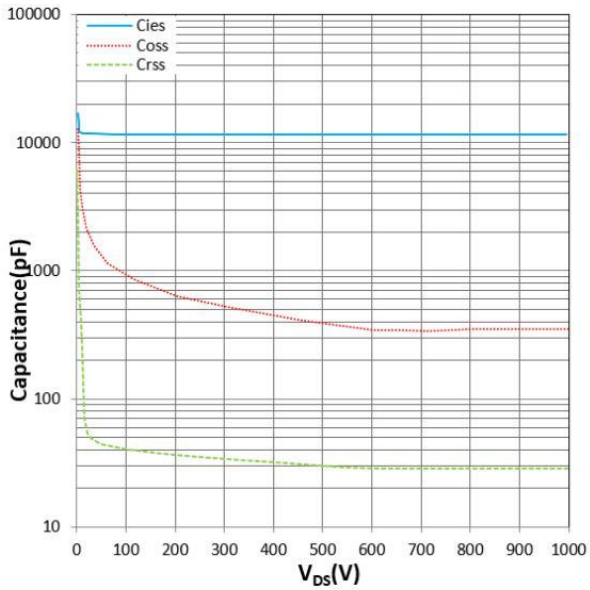
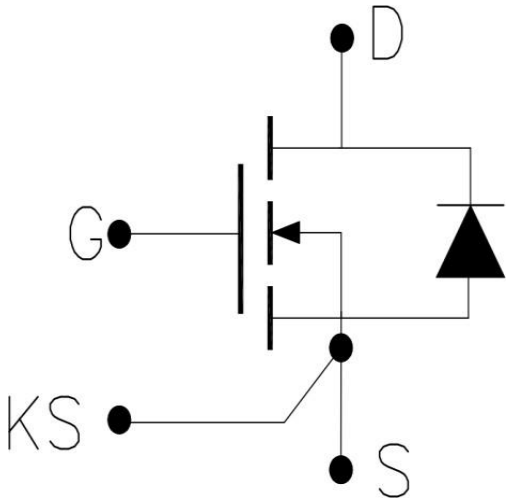


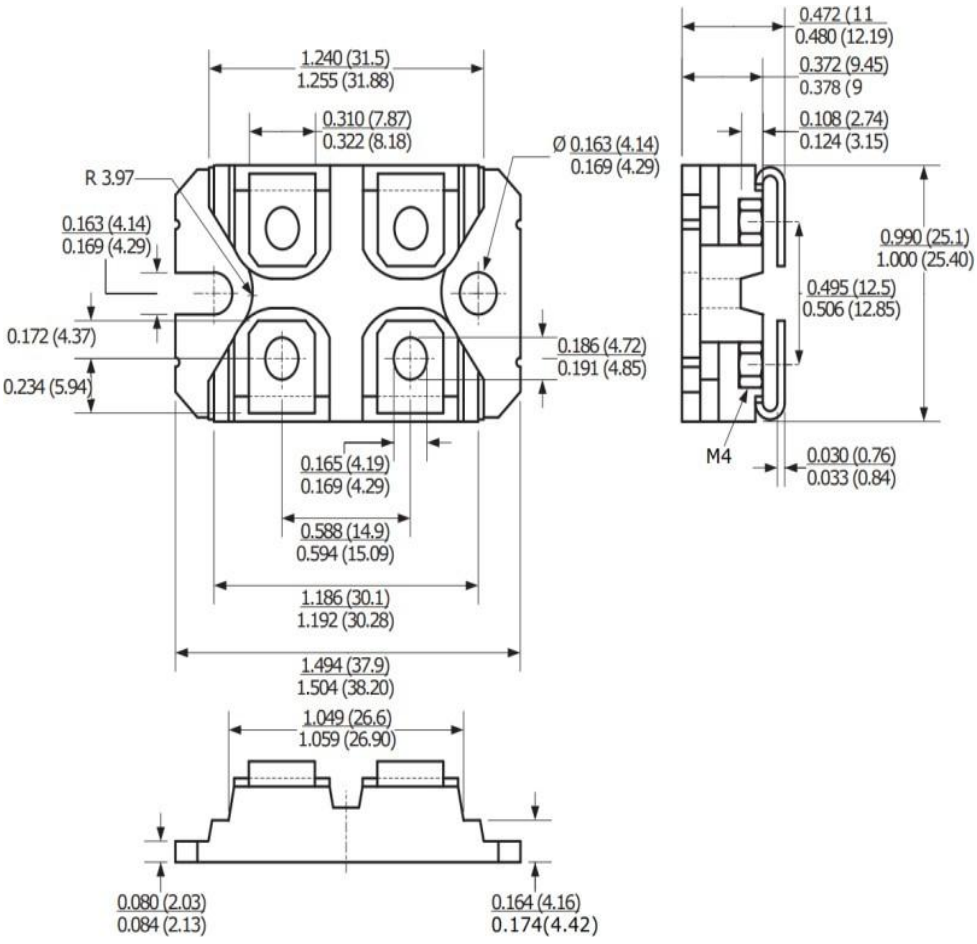
Figure 15. C_{iss},C_{oss},C_{rss} vs V_{DS}
T_j=25°C, f=1MHz, V_{AC} =25mV

Circuit Diagram



Package Outline (Unit: mm):

SOT-227



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