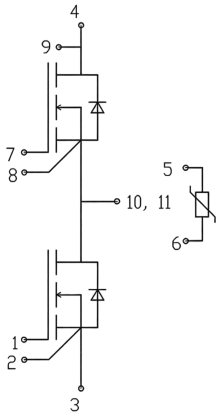
EconoDUAL3 Half Bridge SiC Module

Parameter	Value	Unit
V_{DS}	1700	V
I_D	500	A
$R_{DS(ON)}$	5.2	mΩ
Q_G	840	nC



Features:

- Ultra Low Loss
- High-frequency Operation
- High Temperature, Humidity, and Bias Operation
- Zero Turn-off Tail Current from MOSFET

Applications:

- Motor Drives
- Servo Drives
- UPS Systems
- Wind Turbines
- High-Power Converters

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-source Voltage	1700	V
V_{GS}	Gate-source Voltage (dynamic)	-10/+22	V
I_D	Drain Current (continuous)	500	A
I_{DM}	Drain Current (pulsed)	1000	A
T_{op};T_{stg}	Operating and Storage Temperature Range	-40 to +175	°C
T_J	Junction Temperature	175	°C
L_{Stray}	Stray Inductance	20	nH
V_{isol}	Isolation Test Voltage (DC; 2mA; t=10s)	3.5	kV
$R_{th(j-c)}$	Thermal Resistance, Junction-to-heatsink	0.13	°C/W

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at TC=25°C unless otherwise specified)						
B_{VDS}	Drain-source Breakdown Voltage	1700	-	-	V	V_{GS}=0V
I_{DSS}	Zero Gate Voltage Drain Current	-	-	250	μA	V_{DS}=1700V; V_{GS}=0V
I_{GSS}	Gate-body Leakage Current	-	-	2.5	μA	V_{GS}=-10/20V; V_{DS}=0V
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	V_{DS}=V_{GS} ; I_D=50mA
$R_{DS(on)}$	Static Drain-source on Resistance	-	5.2	6.6	mΩ	V_{GS}=18V; I_D=250A
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	0.7	-	Ω	V_{AC}=25mV; f=1MHz

Dynamic characteristics (at TC=25°C unless otherwise specified)						
C_{iss}	Input Capacitance	-	32.3	-	nF	V_{DS}=1200V; f=100kHz; V_{AC}=25mV
C_{oss}	Output Capacitance	-	0.99	-		
C_{rss}	Reverse Transfer Capacitance	-	80	-	pF	
E_{on}	Turn-on Energy	-	28.5	-	mJ	V_{DS}=1200V; V_{GS}=-5/+18V; I_D=250A; Load=100μH
E_{off}	Turn-off Energy	-	18.9	-		
Q_{GS}	Gate-source Charge	-	260	-	nC	V_{DD}=1200V; V_{GS}=-5/+20V; I_D=250A
Q_{GD}	Gate-drain Charge	-	250	-		
Q_G	Total Gate Charge	-	840	-		
$t_{d(on)}$	Turn-on Delay Time	-	102	-	ns	V_{DD}=1200V; V_{GS}=-5/+18V; I_D=250A; $R_{G(ext)}$=5Ω; Load=100μH
t_r	Rise Time	-	87	-		
$td_{(off)}$	Turn-off Delay Time	-	376	-		
t_f	Fall Time	-	62	-		

Body Diode Characteristics (T_J =25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{FSD}	Forward Voltage	-	3.2	6	V	V_{GS}=0V; I_F=250A
I_S	Continuous Diode Forward Current	-	250	-	A	V_{GS}=0V; T_C=25°C
T_{RR}	Reverse Recovery Time	-	83	-	ns	V_{GS}=-5/+18V; I_F=250A V_R=1200V;$R_{G(ext)}$=5Ω Load=100μH
Q_{RR}	Reverse Recovery Charge	-	3590	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	157	-	A	

NTC Thermistor Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R_{25}	Rated Resistance	-	5.00	-	kΩ	T_{NTC}=25°C
ΔR/R	Deviation of R_{100}	-5	-	5	%	T_{NTC}=100°C; R_{100}=493.3Ω
$B_{25/50}$	Beta Value for 25°C to 50°C	-	3375	-	K	$R_2=R_{25}\exp[B_{25/50}(1/T2-1/(298.15K))]$
$B_{25/80}$	Beta Value for 25°C to 80°C	-	3414	-	K	$R_2=R_{25}\exp[B_{25/80}(1/T2-1/(298.15K))]$
$B_{25/100}$	Beta Value for 25°C to 100°C	-	3436	-	K	$R_2=R_{25}\exp[B_{25/100}(1/T2-1/(298.15K))]$

Typical Characteristics

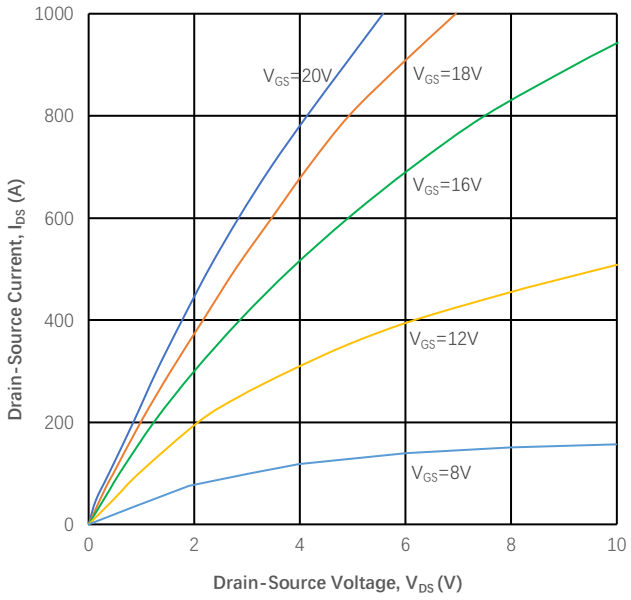


Figure 1
Output Characteristics (T_J=25°C)

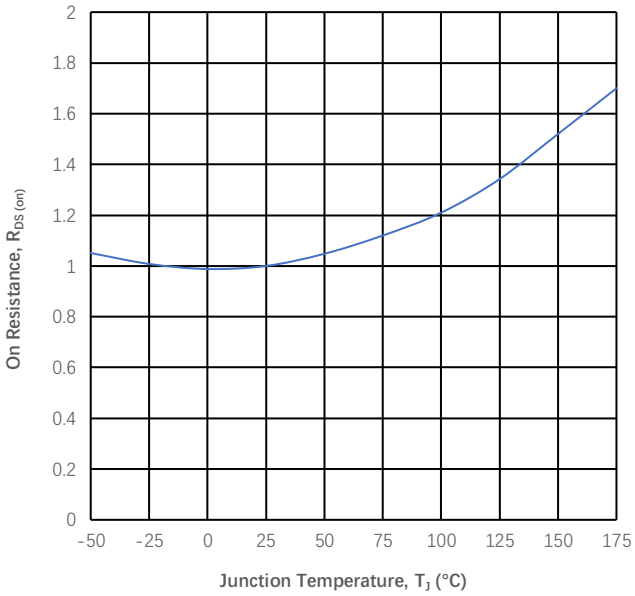


Figure 2
Normalized on-resistance vs. Temperature

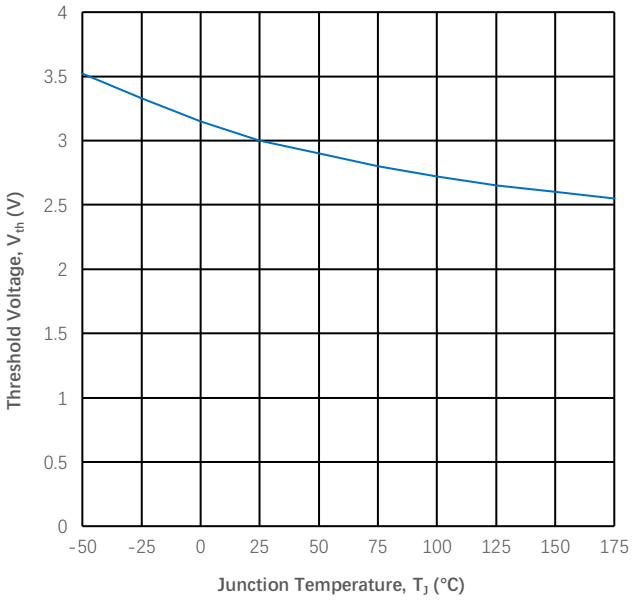


Figure 3
Threshold Voltage vs. Temperature

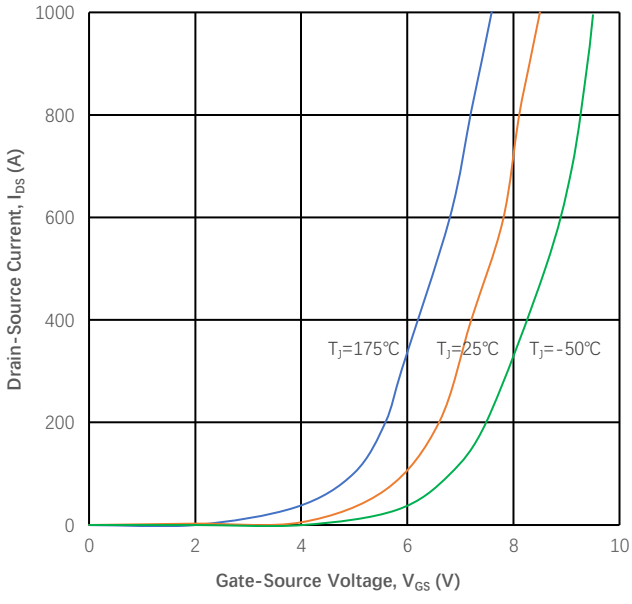


Figure 4
Transfer Characteristic for Various T_J

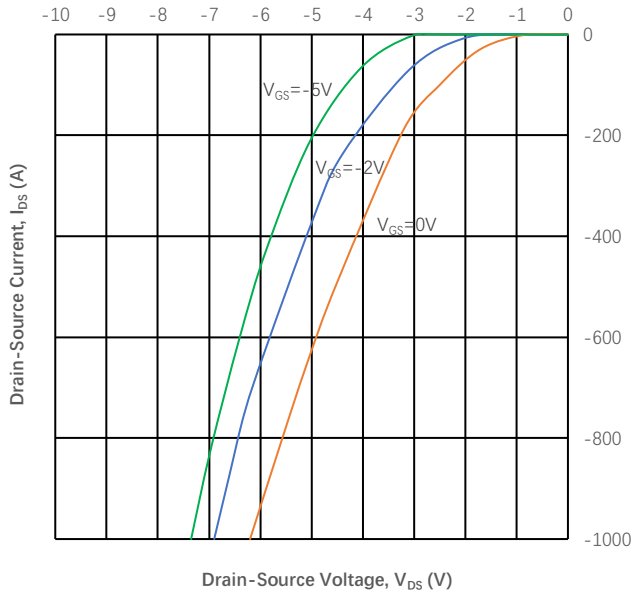


Figure 5

Diode Characteristic at 25˚C

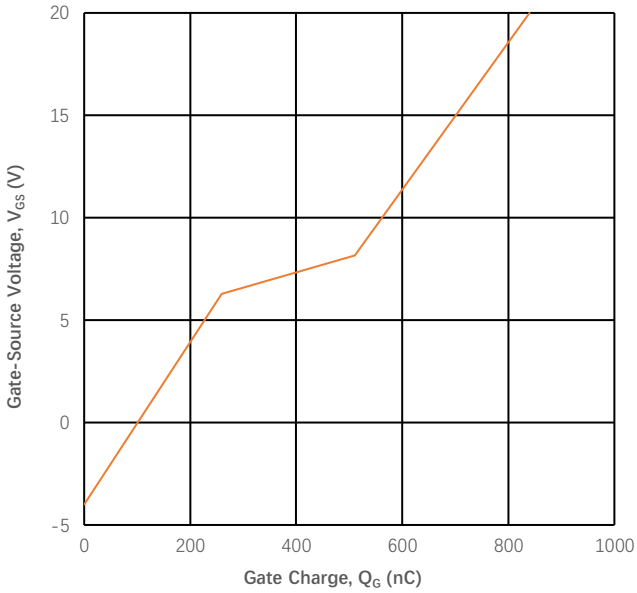


Figure 6

Typical Gate Charge Characteristics

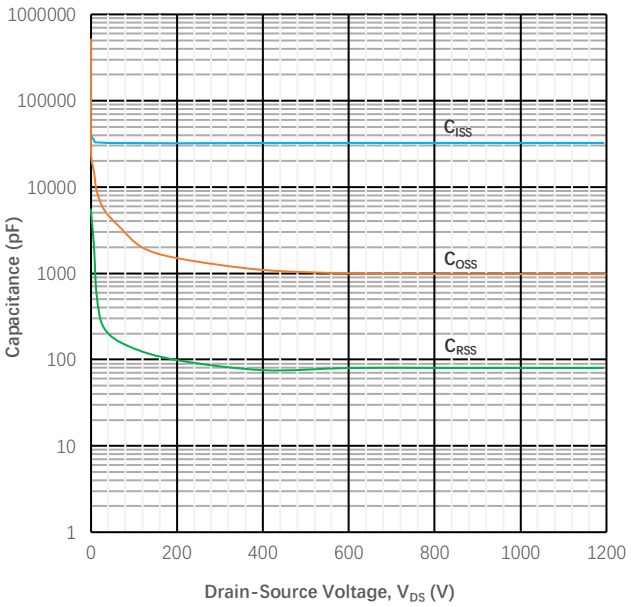


Figure 7

Typical Capacitances vs. Drain-Source Voltage

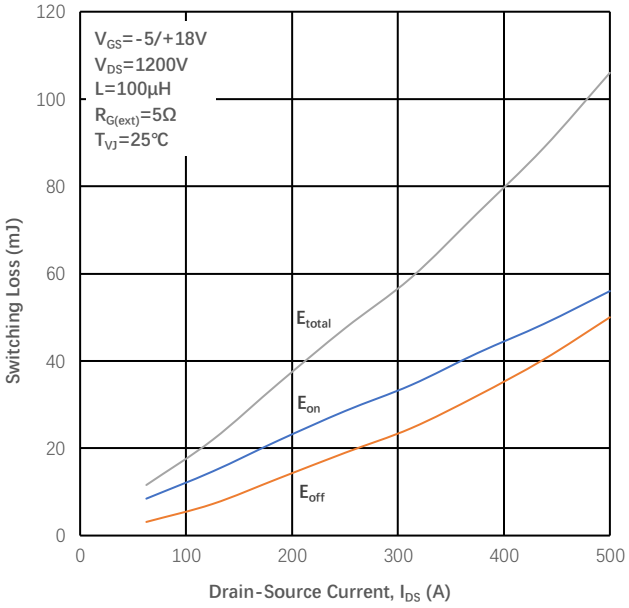


Figure 8

Inductive Switching Energy vs. Drain Current

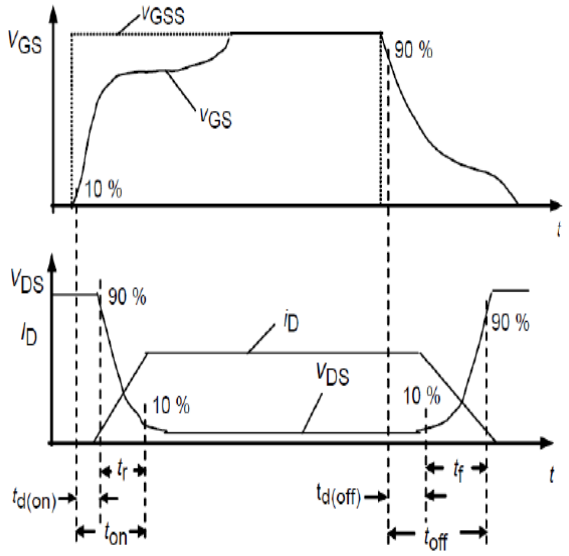


Figure 9
Switching Time Description

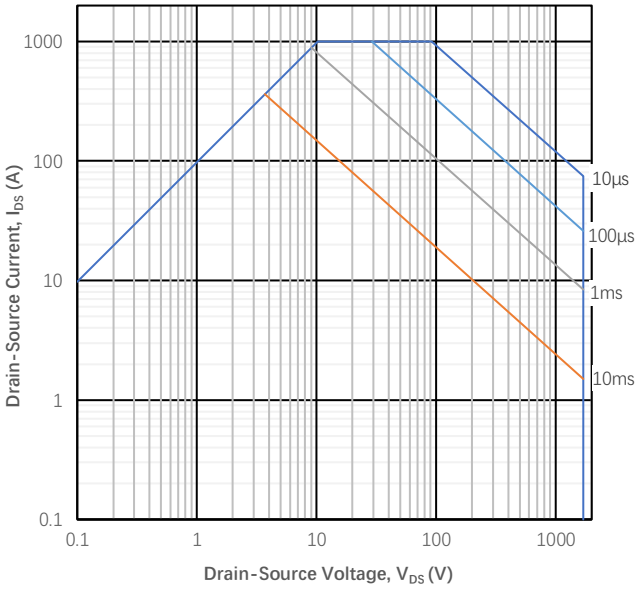
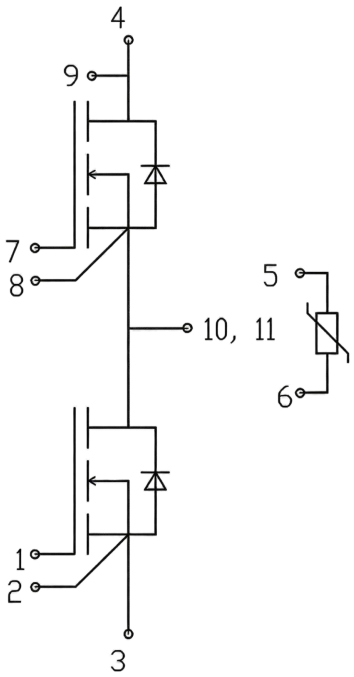
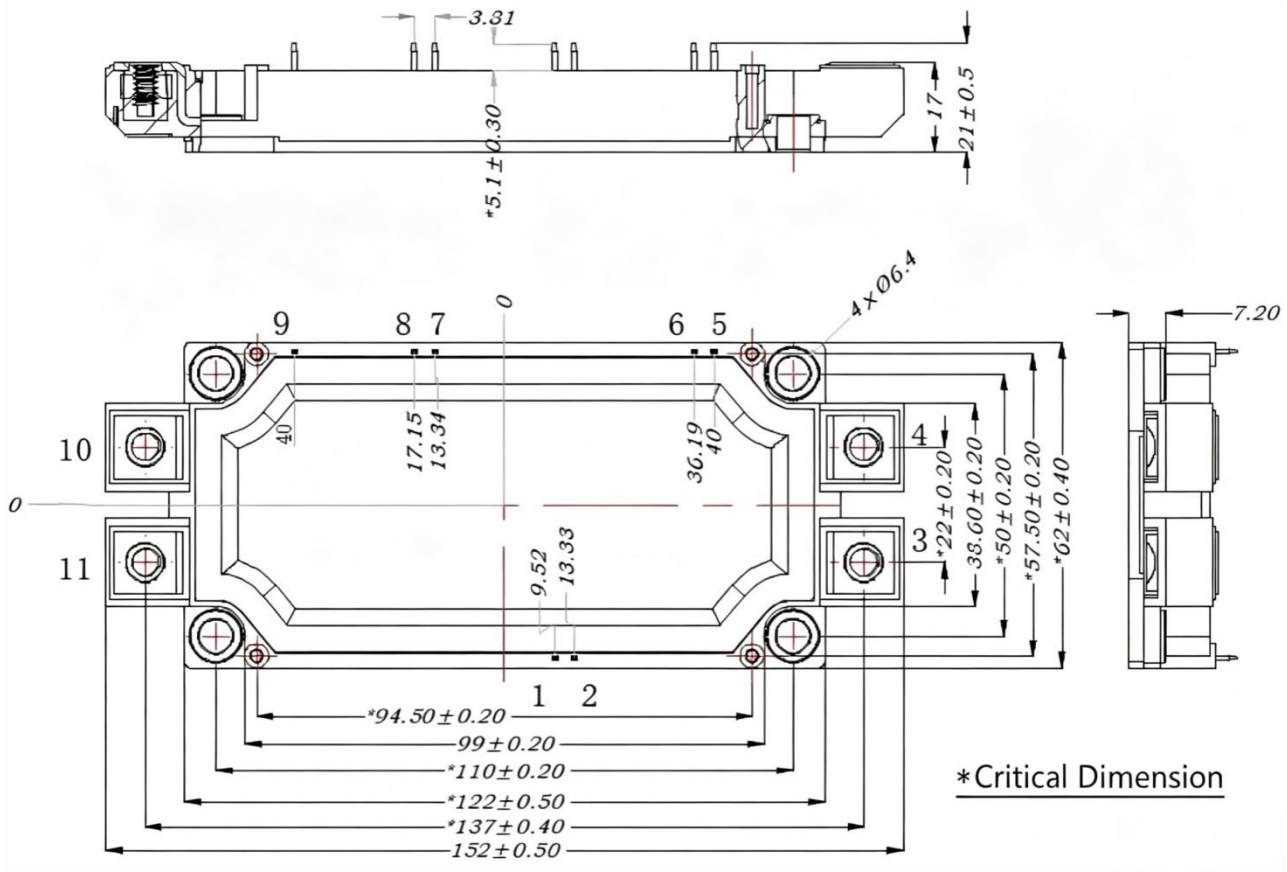


Figure 10
Safe Operating Area

Circuit Diagram



Package Outlines(Unit: mm):



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