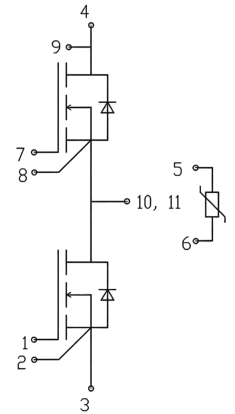


### EconoDUAL3 Half Bridge SiC Module

Parameter	Value	Unit
$V_{DS}$	1700	V
$I_D$	800	A
$R_{DS(ON)}$	3.2	m $\Omega$
$Q_G$	1344	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 ( $T_C=25^\circ\text{C}$ 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)	800	A
$I_{DM}$	Drain Current (pulsed)	1600	A
$T_{op}; T_{stg}$	Operating and Storage Temperature Range	-40 to +175	$^\circ\text{C}$
$T_J$	Junction Temperature	175	$^\circ\text{C}$
$L_{Stray}$	Stray Inductance	20	nH
$V_{isol}$	Isolation Test Voltage (DC; 2mA; t=10s)	4.2	kV
$R_{th(j-c)}$	Thermal Resistance, Junction-to-heatsink	0.13	$^\circ\text{C/W}$

#### MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static characteristics (at <math>TC=25^\circ\text{C}</math> unless otherwise specified)</b>						
$B_{VDS}$	Drain-source Breakdown Voltage	1700	-	-	V	$V_{GS}=0V$
$I_{BSS}$	Zero Gate Voltage Drain Current	-	-	400	$\mu\text{A}$	$V_{DS}=1700V; V_{GS}=0V$
$I_{GSS}$	Gate-body Leakage Current	-	-	4	$\mu\text{A}$	$V_{GS}=-10/20V; V_{DS}=0V$
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}; I_D=80mA$
$R_{DS(on)}$	Static Drain-source on Resistance	-	3.2	3.8	m $\Omega$	$V_{GS}=18V; I_D=400A$
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
$R_G$	Gate Resistance	-	0.44	-	$\Omega$	$V_{AC}=25mV; f=1MHz$

Dynamic characteristics (at TC=25°C unless otherwise specified)						
C <sub>iss</sub>	Input Capacitance	-	51.7	-	nF	V <sub>DS</sub> =1200V; f=100kHz; V <sub>AC</sub> =25mV
C <sub>oss</sub>	Output Capacitance	-	1.6	-		
C <sub>rss</sub>	Reverse Transfer Capacitance	-	128	-		
E <sub>on</sub>	Turn-on Energy	-	60.1	-	mJ	V <sub>DS</sub> =1200V; V <sub>GS</sub> =-5/+18V; I <sub>D</sub> =400A; Load=100μH
E <sub>off</sub>	Turn-off Energy	-	33.4	-		
Q <sub>GS</sub>	Gate-source Charge	-	416	-	nC	V <sub>DD</sub> =1200V; V <sub>GS</sub> =-5/+18V; I <sub>D</sub> =400A
Q <sub>GD</sub>	Gate-drain Charge	-	400	-		
Q <sub>G</sub>	Total Gate Charge	-	1344	-		
t <sub>d(on)</sub>	Turn-on Delay Time	-	118	-	ns	V <sub>DD</sub> =1200V; V <sub>GS</sub> =-5/+18V; I <sub>D</sub> =400A; R <sub>G(ext)</sub> =5Ω; Load=100μH
t <sub>r</sub>	Rise Time	-	81	-		
t <sub>d(off)</sub>	Turn-off Delay Time	-	400	-		
t <sub>f</sub>	Fall Time	-	110	-		

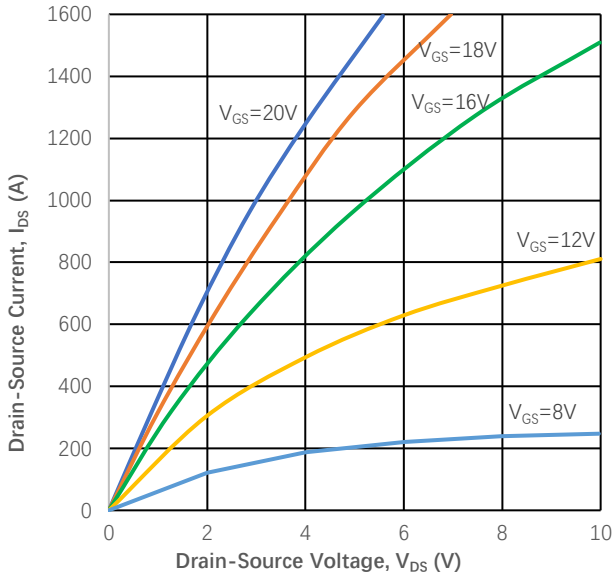
**Body Diode Characteristics (T<sub>J</sub> =25°C unless otherwise specified)**

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V <sub>FSD</sub>	Forward Voltage	-	3.9	6	V	V <sub>GS</sub> =0V; I <sub>F</sub> =400A
I <sub>S</sub>	Continuous Diode Forward Current	-	400	-	A	V <sub>GS</sub> =0V; T <sub>C</sub> =25°C
T <sub>RR</sub>	Reverse Recovery Time	-	90.5	-	ns	V <sub>GS</sub> =-5; I <sub>F</sub> =400A V <sub>R</sub> =1200V; R <sub>G(ext)</sub> =5Ω Load=100μH
Q <sub>RR</sub>	Reverse Recovery Charge	-	7875	-	nC	
I <sub>RRM</sub>	Peak Reverse Recovery Current	-	220	-	A	

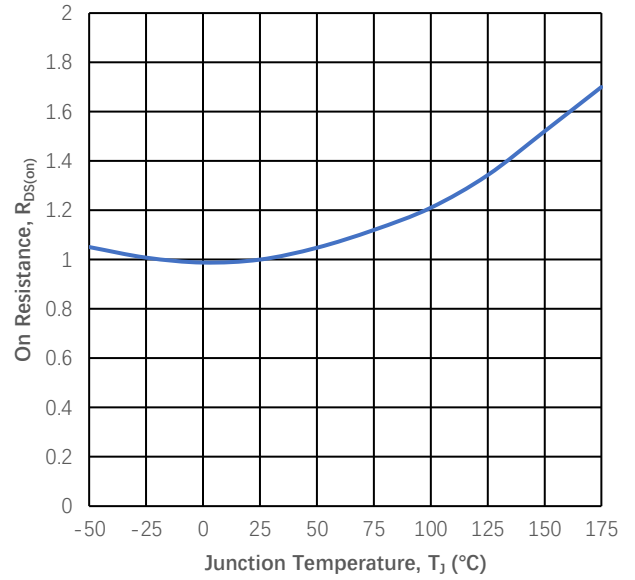
**NTC Thermistor Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R <sub>25</sub>	Rated Resistance	-	5.00	-	kΩ	T <sub>NTC</sub> =25°C
ΔR/R	Deviation of R <sub>100</sub>	-5	-	5	%	T <sub>NTC</sub> =100°C; R <sub>100</sub> =493.3Ω
B <sub>25/50</sub>	Beta Value for 25°C to 50°C	-	3375	-	K	R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/50</sub> (1/T <sub>2</sub> -1/(298.15K))]
B <sub>25/80</sub>	Beta Value for 25°C to 80°C	-	3414	-	K	R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/80</sub> (1/T <sub>2</sub> -1/(298.15K))]
B <sub>25/100</sub>	Beta Value for 25°C to 100°C	-	3436	-	K	R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/100</sub> (1/T <sub>2</sub> -1/(298.15K))]

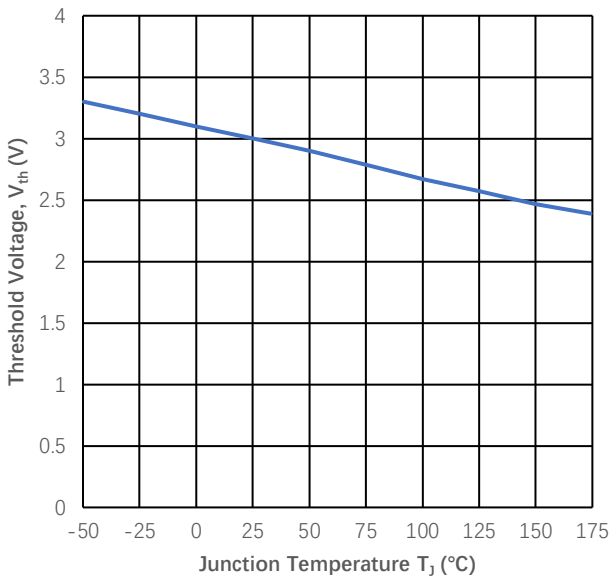
**Typical Characteristics**



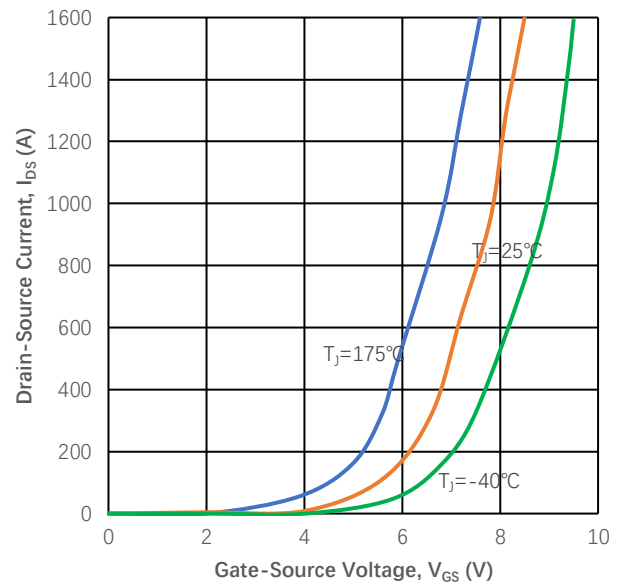
**Figure 1**  
Output Characteristics ( $T_J = 25\text{ }^\circ\text{C}$ )



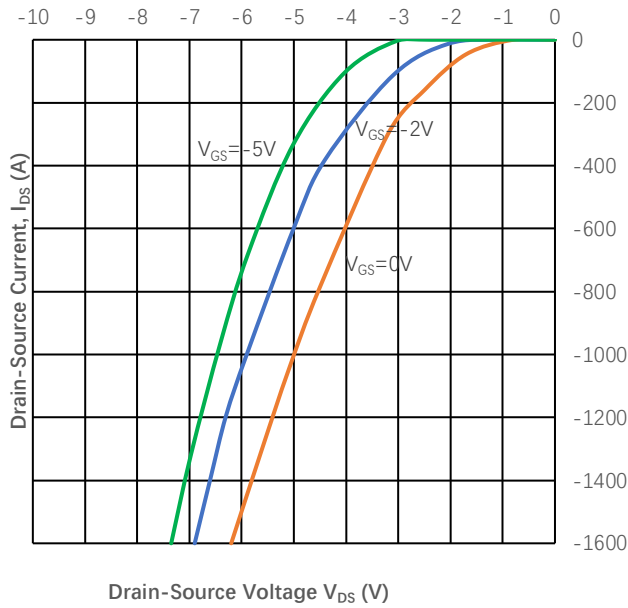
**Figure 2**  
Normalized On-Resistance vs. Temperature



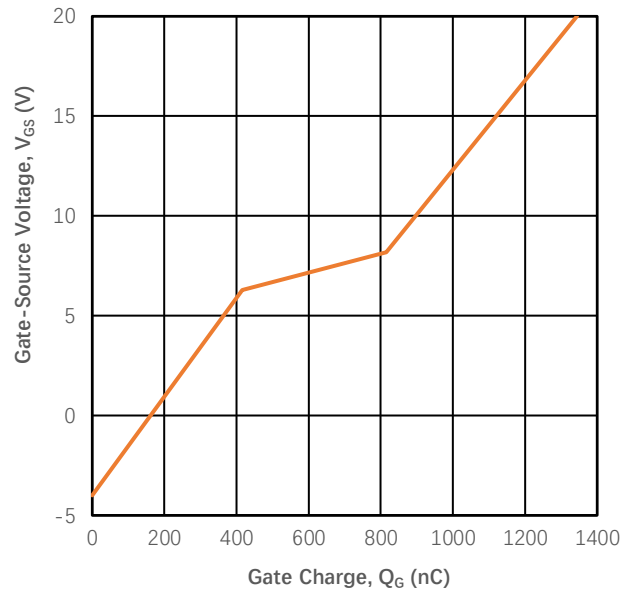
**Figure 3**  
Threshold Voltage vs. Temperature



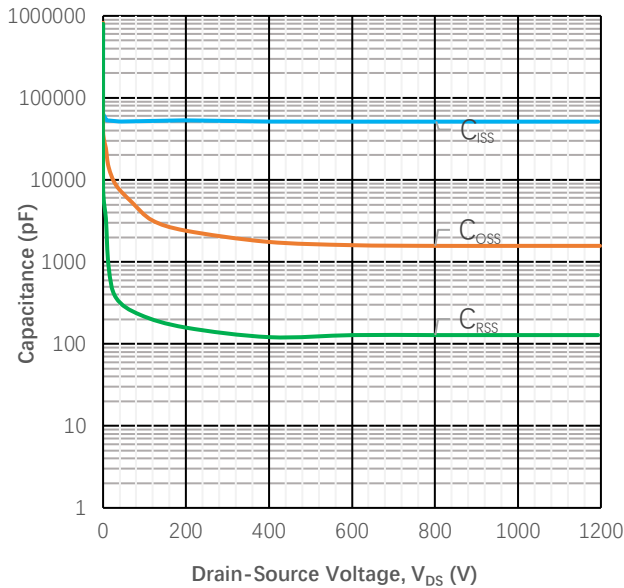
**Figure 4**  
Transfer Characteristic for Various  $T_J$



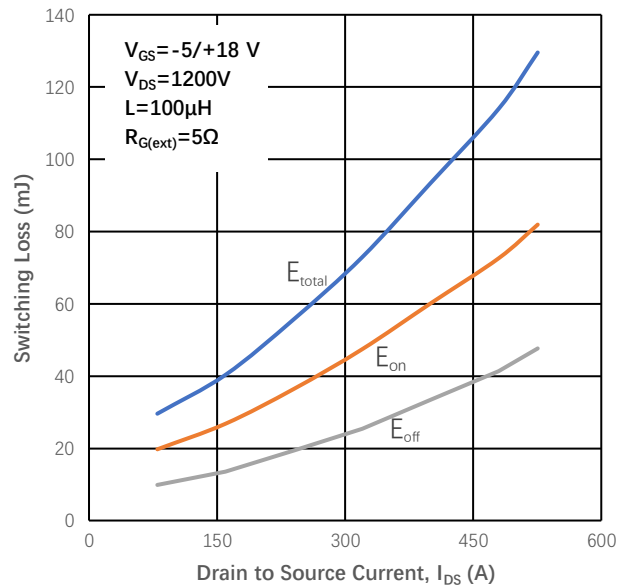
**Figure 5**  
 Diode Characteristic ( $T_J = 25\text{ }^\circ\text{C}$ )



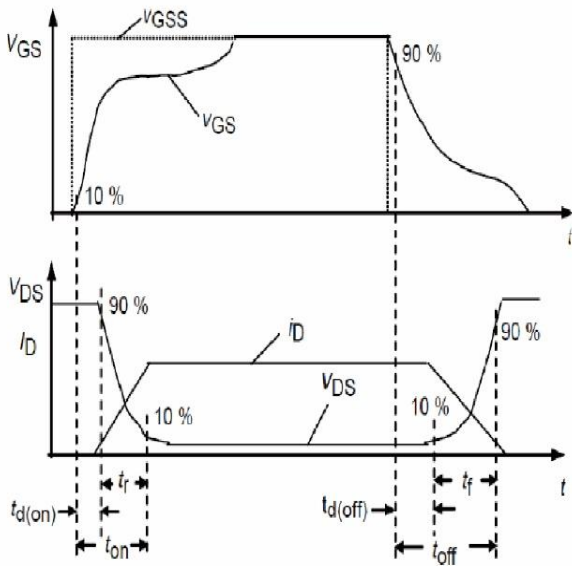
**Figure 6**  
 Typical Gate Charge Characteristics



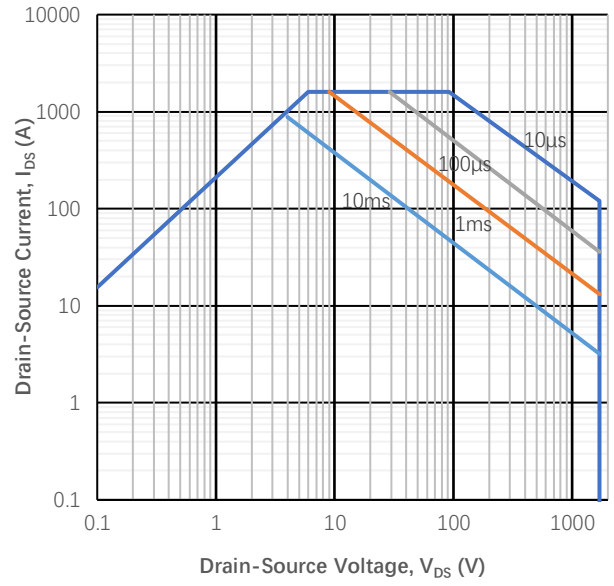
**Figure 7**  
 Typical Capacitances vs. Drain-Source Voltage



**Figure 8**  
 Inductive Switching Energy vs. Drain Current



**Figure 9**  
 Switching Time Description



**Figure 10**  
 Safe Operating Area

**Circuit Diagram**

