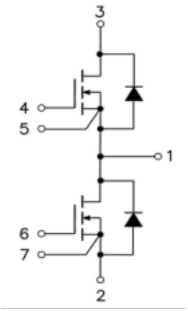
62mm Half Bridge SiC Module

Parameter	Value	Unit
V_{DS}	1200	V
I_D	200	A
$R_{DS(ON)}$	8	mΩ



Features:

- Low switching losses
- Low inductance design
- High current density

Applications:

- DC/DC, High-frequency switch applications
- Motor drive, Power supply
- Inverter, Solar energy applications

Maximum Ratings (T_J=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Value	Unit
Drain-source voltage	Tvj=25°C, VGS=0V, ID= 100μA	V_{DSS}	1200	V
Continuous DC drain current	TC=25°C, VGS= 18V	$I_{D\ nom}$	200	A
Repetitive peak collector current	tP= 1ms	$I_{D\ pulse}$	400	A
Total power dissipation	TC = 25°C, Tvj max = 175°C	P_{tot}	800	W
Static Gate-source voltage	Static (DC)	$V_{GS\ max}$ (DC)	-5/+20	V
Static Gate-source voltage	Duty cycle < 1%, pulse width < 200ns	$V_{GS\ max}$ (Transient)	-10/+23	V
Recommended operation voltage		$V_{GS\ on}$ $V_{GS\ off}$	15 to 18 -3.5 to -2	V

Note1: Pulse width limited by maximum junction temperature

SiC MOSFET Electrical characteristics (Tj =25°C unless otherwise specified, chip)

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Zero gate voltage drain current	V_{GS}=0V, V_{DS}= 1200V	Tvj=25°C	I_{DSS}			100	μA
Gate leakage current	V_{DS}=0V, V_{GS}= -5~20V	Tvj=25°C	I_{GSS}			±100	nA
Gate threshold voltage	V_{GS}=V_{DS}, I_D=40mA	Tvj=25°C Tvj= 175°C	$V_{GS(th)}$	2.0	2.8 2.0	4.0	V
Drain-source on resistance	V_{GS}= 18V, I_D=200A	Tvj=25°C Tvj= 175°C	$R_{DS(on)}$		8 12	10	mΩ
Internal gate resistor	f= 100KHz		R_{Gint}		3.6		Ω
Input capacitance	f=100KHz, VDS=800V VGS=0		C_{iss}		10.2		nF

Output capacitance	V	Tvj=25°C	C_{oss}		620		pF
Reverse transfer capacitance			C_{rss}		36.2		pF
Coss stored energy		Tvj=25°C	E_{oss}		246		μJ
Total gate charge	VDS=800V, ID=200A, VGS=-3 to 18V	Tvj=25°C	Q_G		370		nC
Gate-source charge			Q_{GS}		88		nC
Gate-drain charge			Q_{GD}		190		nC
Turn-on delay time	ID=200A, VDS=800 V VDS=+18V/-3.5V, RG=2.7Ω L= 100μH	Tvj=25°C Tvj= 125°C Tvj= 175°C	td on		45 41 39		ns
Rise time	ID=200A, VDS=800 V VDS=+18V/-3.5V, RG=2.7Ω L= 100μH	Tvj=25°C Tvj= 125°C Tvj= 175°C	tr		60 54 52		
Turn-off delay time	ID=200A, VDS=800 V VDS=+18V/-3.5V, RG=2.7Ω, L= 100μH	Tvj=25°C Tvj= 125°C Tvj= 175°C	td off		94 112 118		
Fall time	ID=200A, VDS=800 V VDS=+18V/-3.5V, RG=2.7Ω, L= 100μH	Tvj=25°C Tvj= 125°C Tvj= 175°C	tf		30 32 32		
Turn-on energy loss per pulse	ID=200A, VDS=800 V VDS=+18V/-3.5V, RG=2.7Ω, L=100μH, di/dt=42.7kV/μs (Tvj= 175℃)	Tvj=25°C Tvj= 125°C Tvj= 175°C	Eon		5.3 4.8 4.6		mJ
Turn-off energy loss per pulse	ID=200A, VDS=800 V VDS=+18V/-3.5V, RG=2.7Ω, L=100μH, dv/dt= 15.4kA/μs (Tvj= 175℃)	Tvj=25°C Tvj= 125°C Tvj= 175°C	Eoff		3.5 3.7 3.9		
Thermal resistance, junction to case	per MOSFET		R_{thJC}		0.18		K/W
Temperature under switching conditions			Tvj op	-40		175	°C

Note1: Assumes Thermal Conductivity of grease is 2.8 W/m・K and thickness is 50um.

Body Diode Electrical characteristics (T_j =25°C unless otherwise specified, chip: Target)

Parameter	Conditions	Symbol	Value	Unit
Continuous DC forward current	V_{GS}=-2V, Tvj=25°C	I_{SD}	200	A
Repetitive peak forward current	V_{GS}=-2V, Tvj=25°C, tp<1ms	I_{SDM}	400	A

Diode Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F=200A, V_{GS}=-2V I_F=200A, V_{GS}=-2V I_F=200A, V_{GS}=-2V	Tvj=25°C Tvj= 125°C Tvj= 175°C	V_F		5.9 5.5 5.3		V

Peak reverse recovery current	I_F=200A, di_F/dt=10kA/μs(T_{vj}=175。C) V_R=800V, V_{GS}=-3.5V/+18V	T_{vj}=25°C T_{vj}=125°C T_{vj}=175°C	I_{RM}		176 210 255		A
Recovered charge	I_F=200A, di_F/dt= 10kA /μs(T_{vj}=175。C) V_R=800V, V_{GS} =-3.5V/+18V	T_{vj}=25°C T_{vj}=125°C T_{vj}=175°C	Q_{rr}		8.0 5.2 4.9		μC
Reverse recovered energy	I_F=400A, di_F/dt= 10kA /μs(T_{vj}=175。C) V_R=800V, V_{GS} =-3.5V/+18V	T_{vj}=25°C T_{vj}=125°C T_{vj}=175°C	E_{rec}		682 765 862		uJ

Module Characteristics

Parameter	Conditions	Symbol	Value			Unit
Isolation test voltage	RMS, f=50Hz, t= 1min	VISOL	4000			V
Internal isolation			Al2O3			
Storage temperature		Tstg	-40		125	°C
Mounting torque for modul mounting		M	3.0		6.0	Nm
Weight		W		325		g

Characteristics diagrams

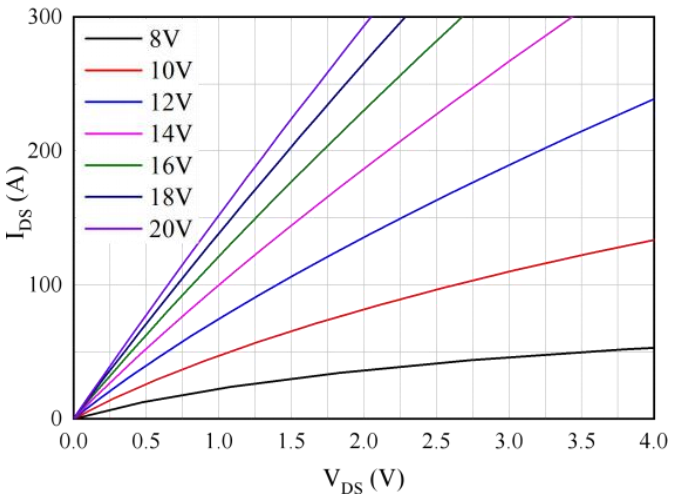


Figure 1. Typical output characteristics (Tvj=25℃)

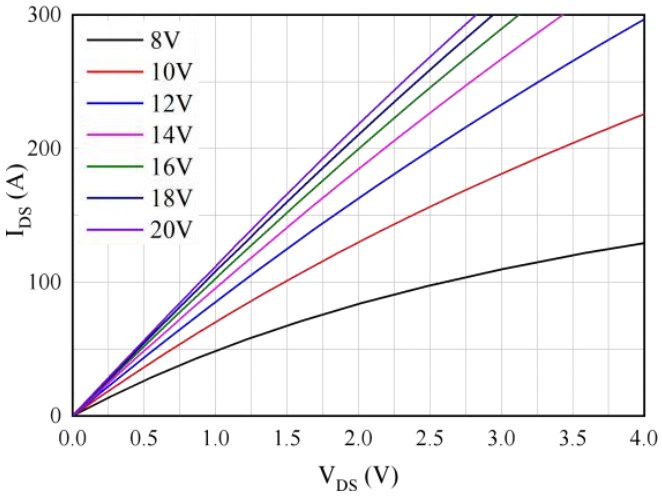
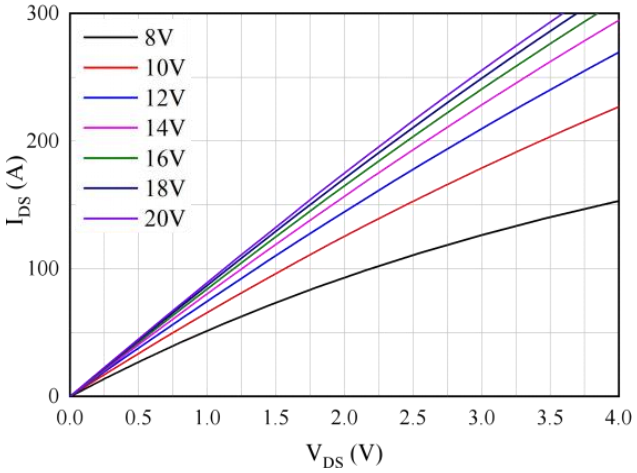


Figure 2.Typical output characteristics (Tvj= 125℃)



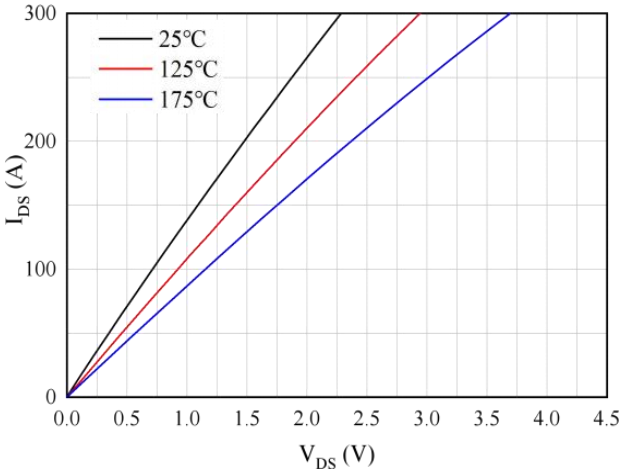


Figure 3. Typical output characteristics (Tvj= 175℃)

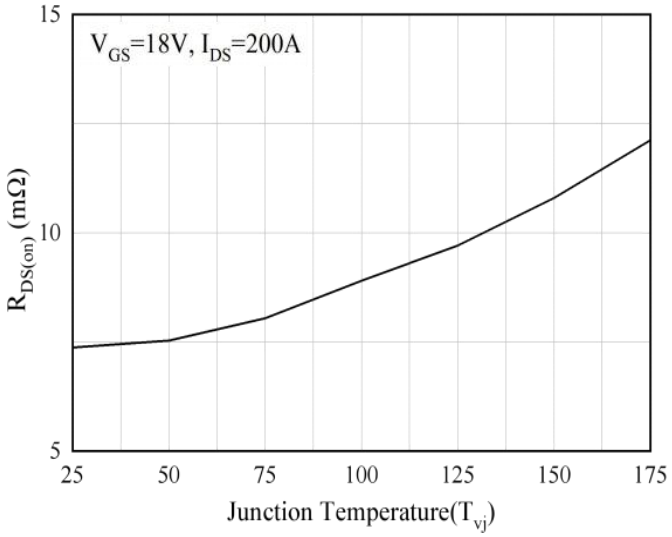


Figure 4. Output curves (VGS= 18V)

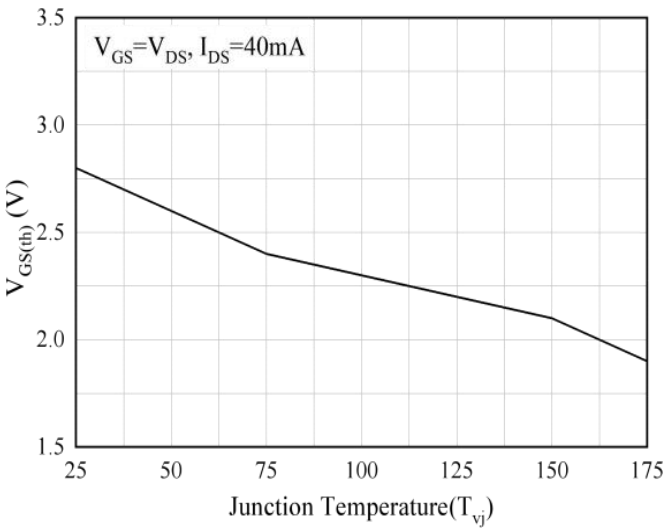
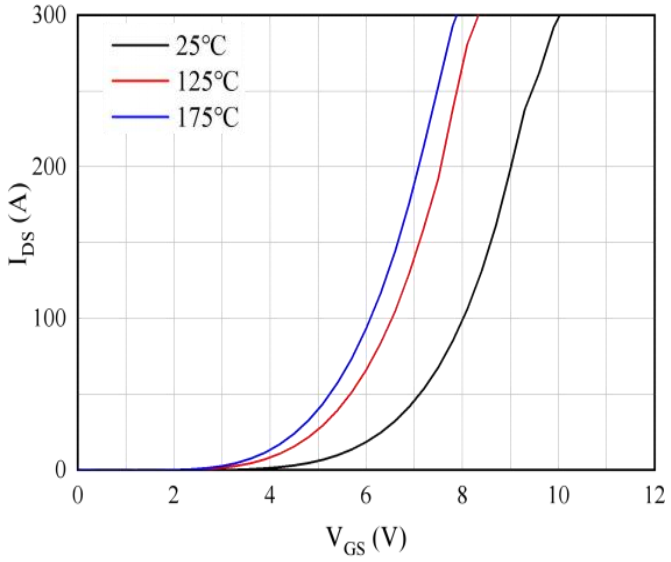


Figure 5. RDS(on) on vs. Temperature

Figure 6. VGS(th) vs. Temperature



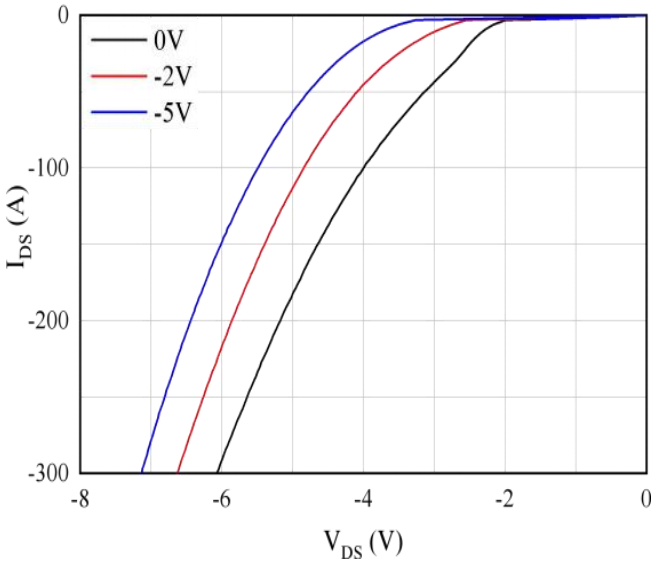
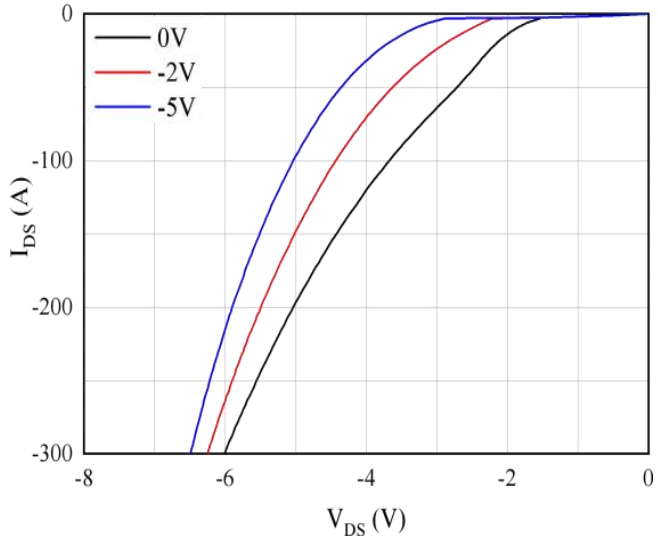


Figure 7. Transfer curves (VDS=20V)

Figure 8. Body diode curves(Tvj=25℃)



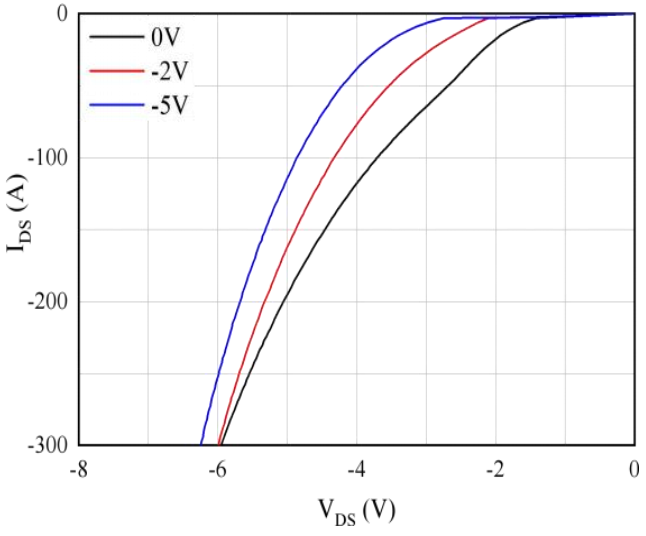


Figure 9. Body diode curves (Tvj= 125℃)

Figure 10. Body diode curves (Tvj= 175℃)

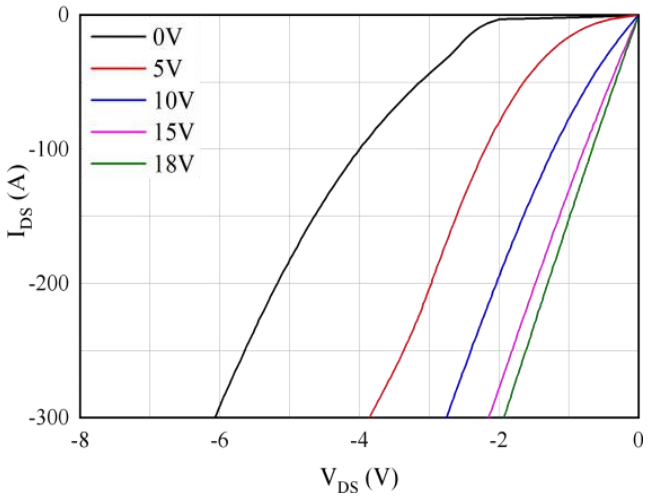


Figure 11. 3rd Quadrant curves (Tvj=25℃)

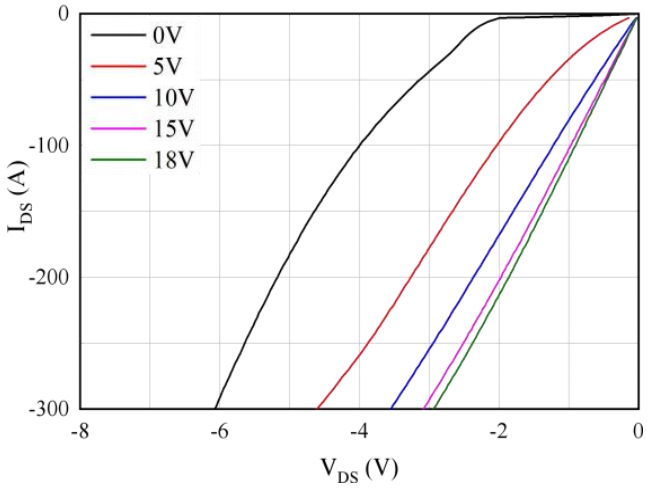


Figure 12. 3rd Quadrant curves (Tvj= 125℃)

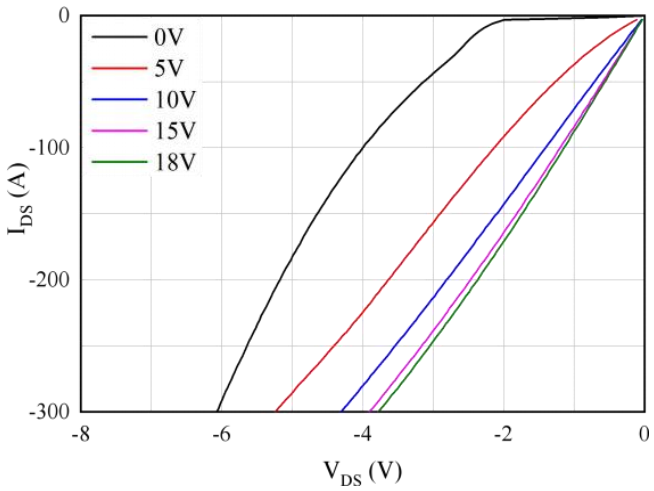


Figure 13. 3rd Quadrant curves (Tvj= 175℃)

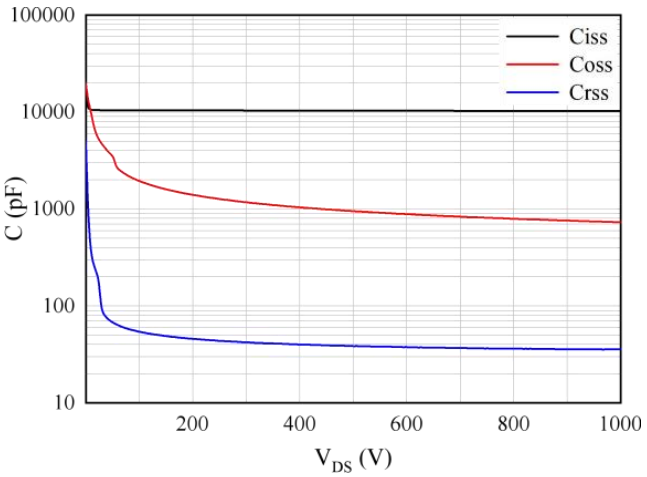


Figure 14. Capacitance vs. VDS

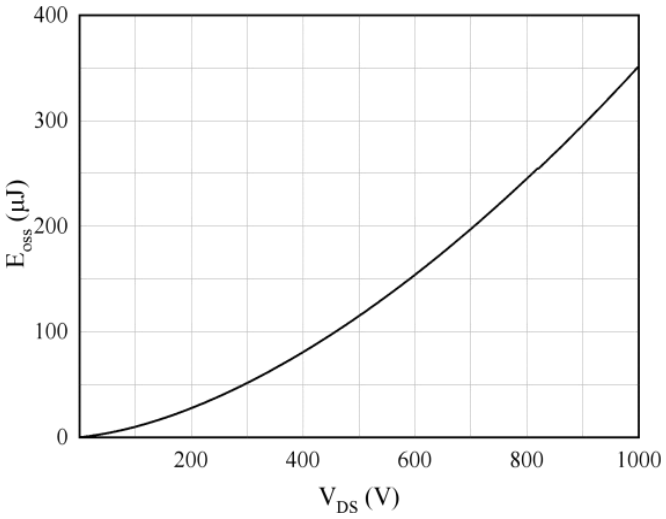


Figure 15. Output capacitor stored energy

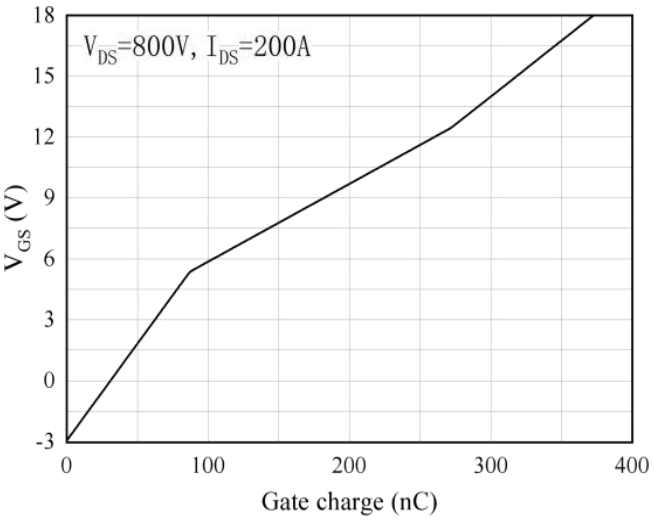


Figure 16. Gate charge characteristics

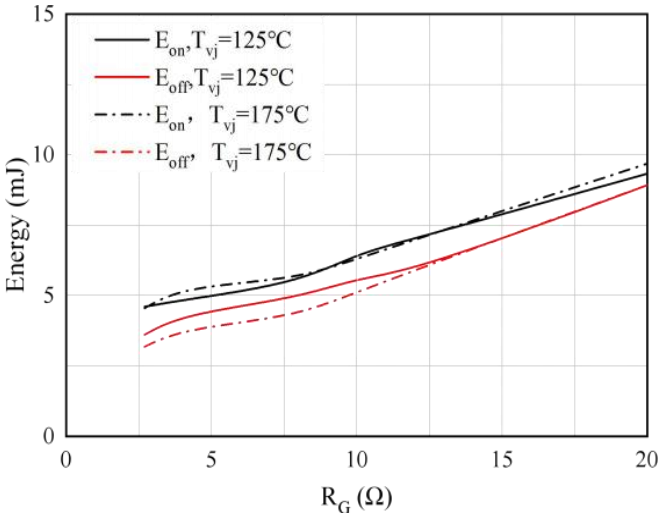


Figure 17. Switching energy vs. RG(ext)

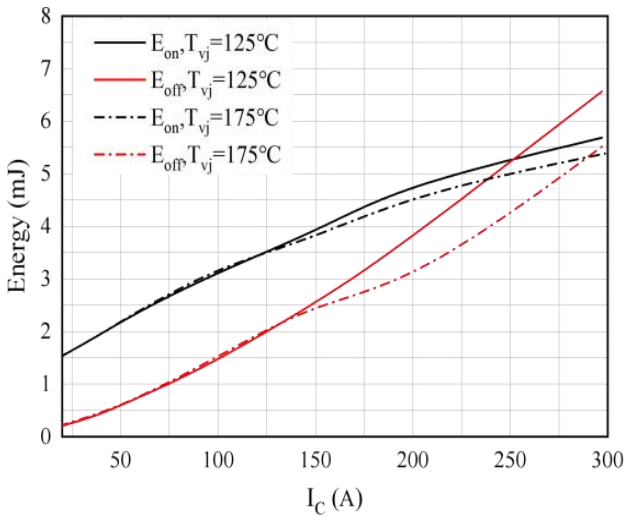


Figure 18. Switching energy vs.IDS

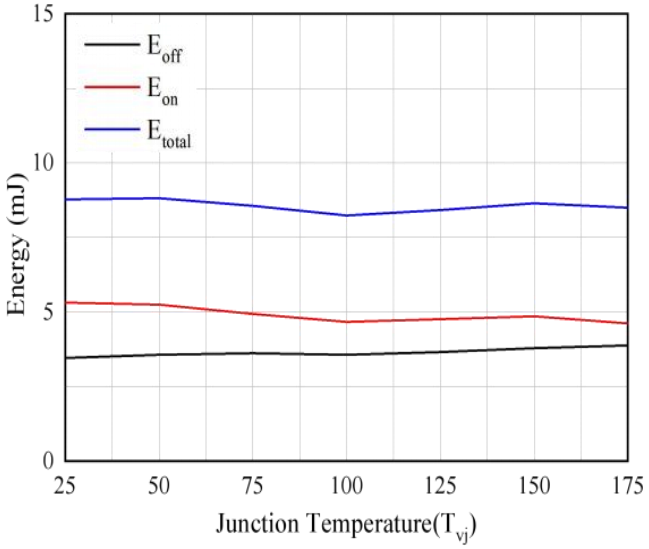


Figure 19. Switching energy vs. Temperature

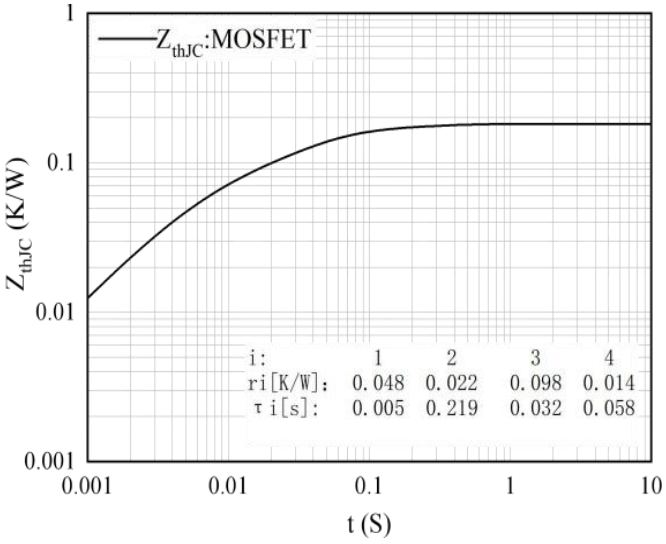
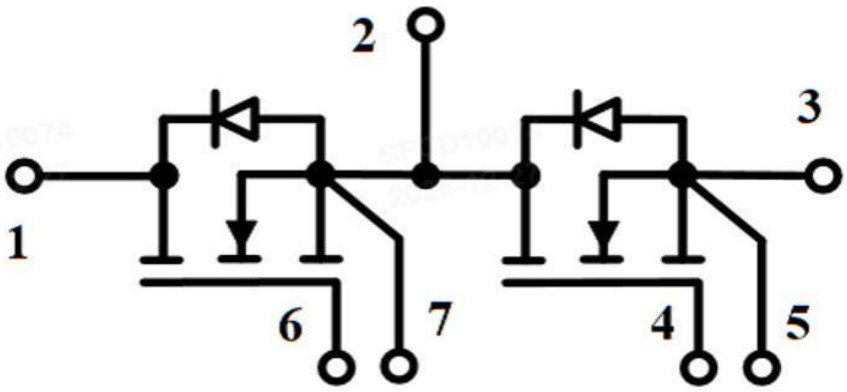
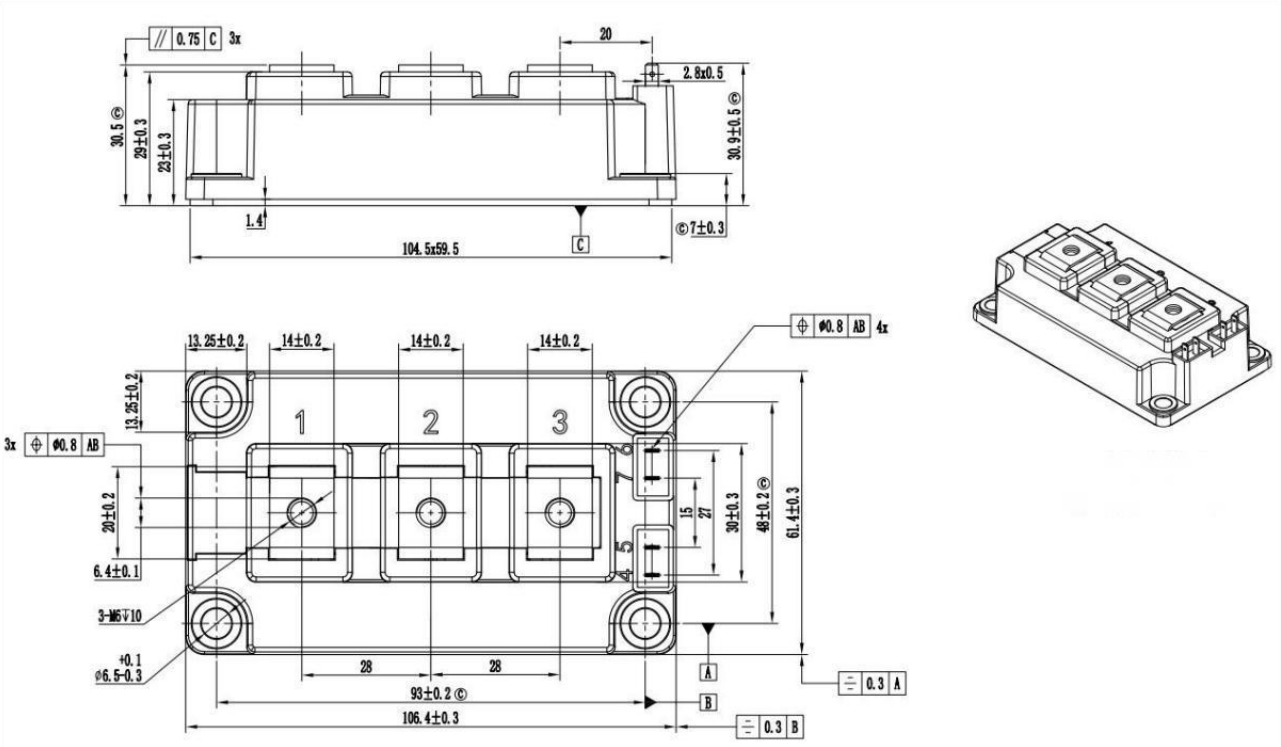


Figure 20. Transient thermal impedance MOSFET

Internal Circuit:



Package Outline (Unit: mm):



*IMPORTANT INFORMATION AND NOTICE

The specifications of Zhuhai Hypersemi Co., Ltd. products may not be considered as a guarantee or assurance of product characteristics. The specifications describe only the usual characteristics of products expected in typical applications, which may still vary depending on the specific application.Therefore, products must be tested for the respective application in advance, and application adjustments may be necessary. The user of our products is responsible for the safety of their applications embedding our products and must take adequate safety measures to prevent the applications from causing physical injury, fire or other problems if any of our products become faulty. The user is responsible for ensuring that the application design complies with all applicable laws, regulations, norms, and standards. Except as otherwise explicitly approved by Zhuhai Hypersemi Co., Ltd. in a written document signed by authorized representatives, our products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

No representation or warranty is given, and no liability is assumed with respect to the accuracy, completeness, and/or use of any information herein, including without limitation, warranties of non-infringement of intellectual property rights of any third party. Zhuhai Hypersemi Co., Ltd. does not assume any liability arising out of the applications or use of any product; neither does it convey any license under its patent rights, copyrights, trade secrets, or other intellectual property rights, nor the rights of others. We make no representation or warranty of non-infringement or alleged non-infringement of intellectual property rights of any third party which may arise from applications. Due to technical requirements, our products may contain dangerous substances. For information on the types in question, please contact the nearest sales office. This document supersedes and replaces all information previously supplied and may be superseded by updates. We reserve the right to make changes.