

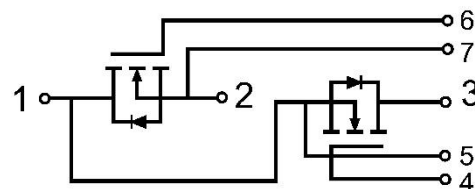
MSC280HF120T1WH

SiC MOSFET Module

Circuit Diagram

Features:

- $V_{DS}=1200V$ $R_{DS(on)}=6.3m\Omega$ SiC MOSFET Module
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Lead Free, Compliant with RoHS Requirement
- Copper Baseplate and Aluminum Oxide Insulator



Applications:

- Solar Inverters
- Motor Drives
- EV Charging
- High Voltage DC-DC Converters
- SMPS、UPS
- Smart Grid Transmission and Distribution
- Induction Heating and Welding



Type	Package	Marking
MSC280HF120T1WH	T1W	MSC280HF120T1WH

MOSFET

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{DSS}	Drain-Source Voltage		1200	V
V_{GSmax}	Gate-Source Voltage(Absolute maximum values)		-10/+23	V
V_{GSop}	Gate-Source Voltage(Recommended operational values)		-5/+18	V
I_{DDC}	Continuous Drain Current Limited by T_{Jmax}	$T_C=80^\circ C$	150	A
		$T_C=25^\circ C$	188	A
I_{DRM}	Repetitive peak drain current	T_p limited by T_{Jmax}	300	A
P_D	Maximum Power Dissipation	$T_C=25^\circ C, T_{Jmax}=175^\circ C$	474	W



MSC280HF120T1WH

SiC MOSFET Module Datasheet

Electrical Characteristics of IGBT ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=1mA$	1200			V
$V_{GS(th)}$	Gate threshold voltage	$I_D=90mA$, $V_{DS}=V_{GS}$	2.0	3.0	4.0	V
$R_{DS(on)}$	Drain-source on-resistance	$I_D=150A$, $V_{GS}=18V$ $T_J=25^{\circ}\text{C}$		6.3	8.5	$m\Omega$
				10.1		$m\Omega$
				13.4		$m\Omega$
I_{DSS}	Drain-source leakage current	$V_{GS}=0V$, $V_{DS}=1200V$, $T_J=25^{\circ}\text{C}$			0.3	mA
I_{GSS}	Gate-source leakage current	$V_{GS}=23V$, $V_{DS}=0V$, $T_J=25^{\circ}\text{C}$			400	nA
		$V_{GS}=-10V$, $V_{DS}=0V$, $T_J=25^{\circ}\text{C}$			-400	nA
C_{iss}	Input Capacitance	$V_{DS}=1000V$, $V_{GS}=0V$, $f=100kHz$		11.20		nF
C_{oss}	Output Capacitance			0.42		nF
C_{rss}	Reverse Transfer Capacitance			0.04		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{DD} =800V, I _D =150A, R _{Gon} =5.5Ω, V _{GS} =-3/18V, Inductive Load	T _J =25°C		32		ns
			T _J =125°C		27		
			T _J =175°C		26		
t _r	Rise Time		T _J =25°C		14		ns
			T _J =125°C		13		
			T _J =175°C		12		
t _{d(off)}	Turn-off Delay Time		T _J =25°C		46		ns
			T _J =125°C		51		
			T _J =175°C		54		
t _f	Fall Time	T _J =25°C		12.0		ns	
		T _J =125°C		13.2			
		T _J =175°C		13.7			
E _{on}	Turn-on Switching Loss	V _{DD} =800V, I _D =150A, R _{Gon} =5.5Ω, V _{GS} =-3/18V, di/dt=13.5KA/μs(T _J =175°C) Inductive Load	T _J =25°C		11.4		mJ
		T _J =125°C		11.8			
		T _J =175°C		12.3			



MSC280HF120T1WH

SiC MOSFET Module Datasheet

E _{off}	Turn-off Switching Loss	V _{DD} =800V, I _D =150A, R _{Goff} =2.2Ω, V _{GS} =-3/18V, du/dt=21.5KV/μs(T _J =175°C) Inductive Load	T _J =25°C		7.8		mJ
			T _J =125°C		8.3		
			T _J =175°C		8.5		
Q _g	Total Gate Charge	V _{DD} =800V, I _D =150A V _{GS} =-3/18V	T _J =25°C		446		nC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		2.5		Ω
R _{θJC}	MOSFET Thermal Resistance: Junction-to-Case (per MOSFET)					0.316	°C/W
R _{θCS}	MOSFET Thermal Resistance: Case-to-Sink (per MOSFET) (per MOSFET, λ _{grease} = 1 W/(m · K))				0.062		°C/W

Body diode(MOSFET)

Maximum Rated Values of Body diode (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _{SD}	Body Diode Continuous Forward Current		150	A
I _{SDM}	Body Diode Maximum Forward Current	t _p =1ms	300	A

Electrical Characteristics of Body Diode

 (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{SD}	Forward Voltage	I _{SD} =150A, V _{GS} =-3V	T _J =25°C		4.15		V
			T _J =125°C		4.77		
			T _J =175°C		4.63		
I _{rrm}	Peak Reverse Recovery Current	V _R =800V, I _{SD} =150A di/dt=13.5KA/us V _{GS} =-3V T _J =25°C			106		A
Q _{rr}	Reverse Recovery Charge				1.36		uC
E _{rec}	Reverse Recovery Loss				0.52		mJ



MSC280HF120T1WH

SiC MOSFET Module Datasheet

Module

Symbol	Description	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted) f=50Hz, t=1min	2500			V
T _J	Maximum Junction Temperature			175	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		175	°C
T _{stg}	Storage Temperature	-40		125	°C
CTI	Comparative Tracking Index	200			
M	Power Terminals Screw:M5	3.0		5.0	N·m
M	Mounting Screw:M5	3.0		6.0	N·m
G	Weight		150		g

Ordering Information Table

Device code	M	SC	280	HF	120	T1W	H
	①	②	③	④	⑤	⑥	⑦

- ① - MOSFET Module
- ② - SiC MOSFET
- ③ - Rated Current (280=280A)
- ④ - Circuit Configuration:HF (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



MSC280HF120T1WH

SiC MOSFET Module Datasheet

Characteristic diagram

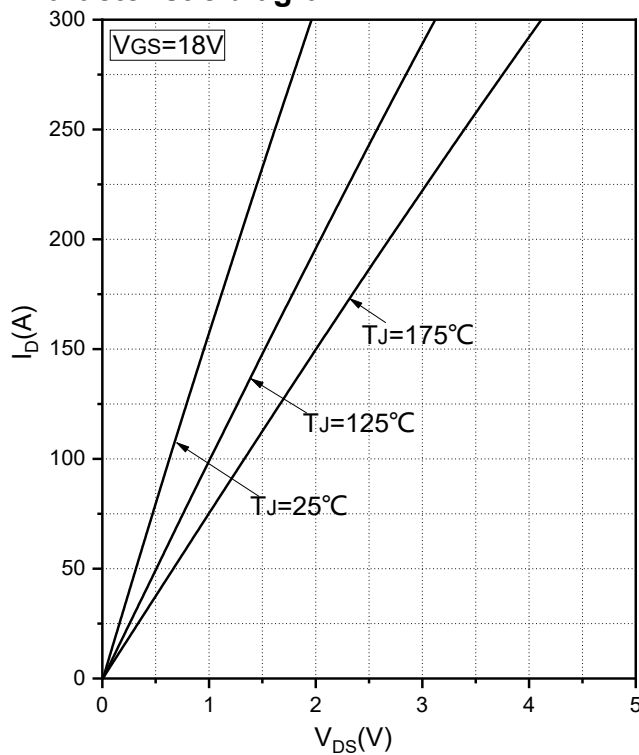


Fig.1 Typical Saturation Voltage Characteristics

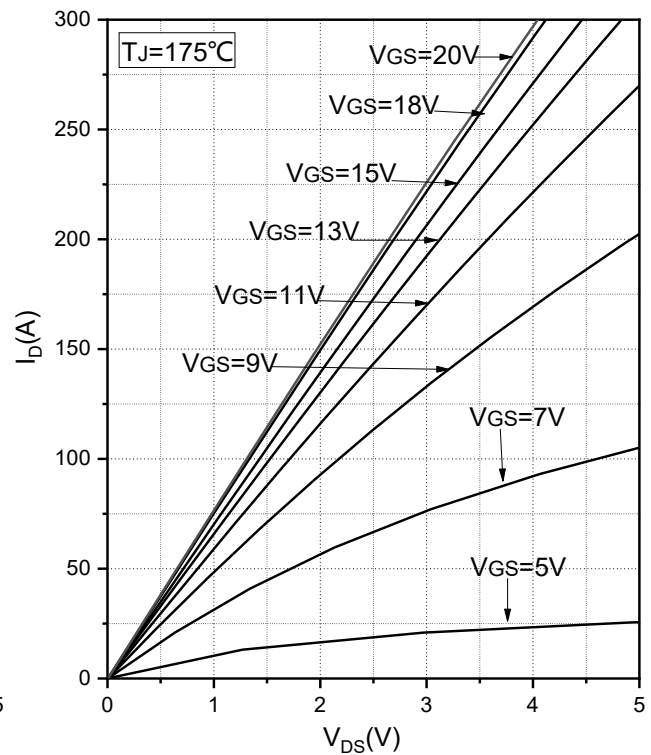


Fig.2 Typical Output Characteristics

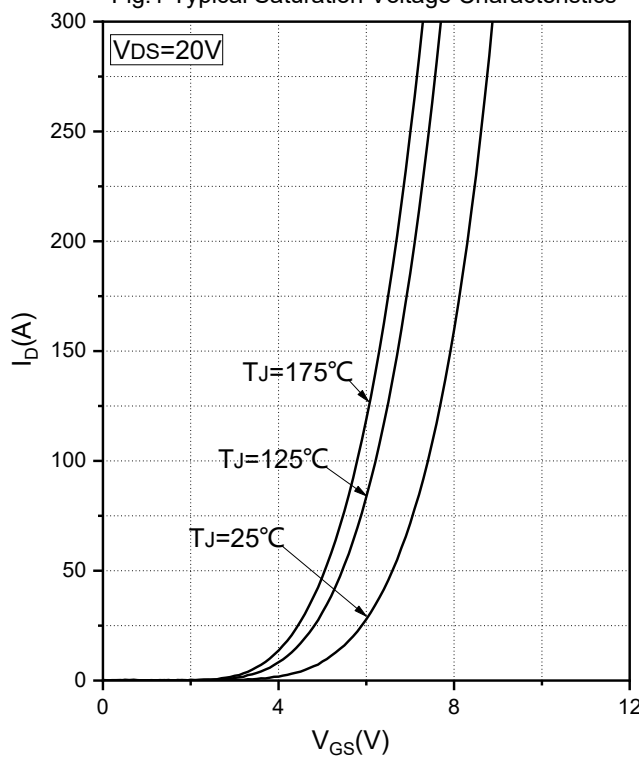


Fig.3 Transfer Characteristic

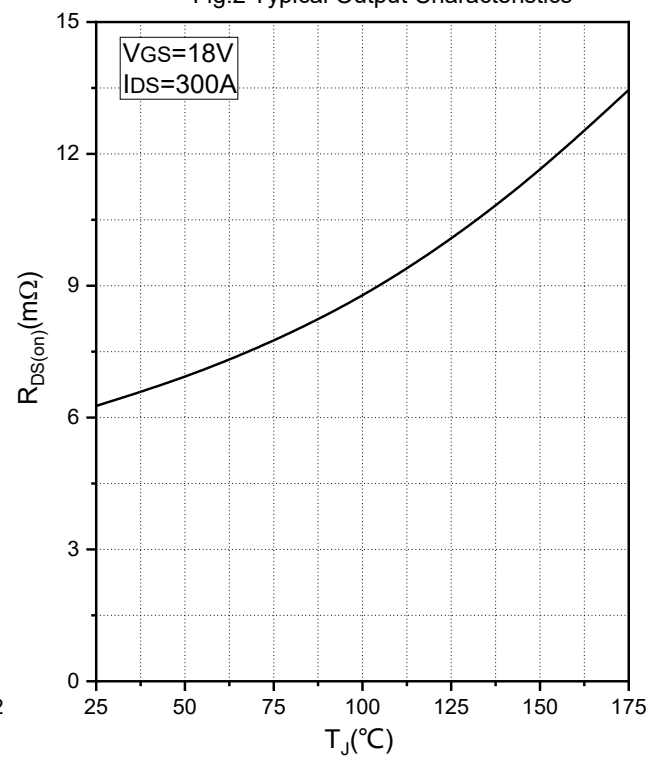


Fig.4 Drain source on-resistance



MSC280HF120T1WH

SiC MOSFET Module Datasheet

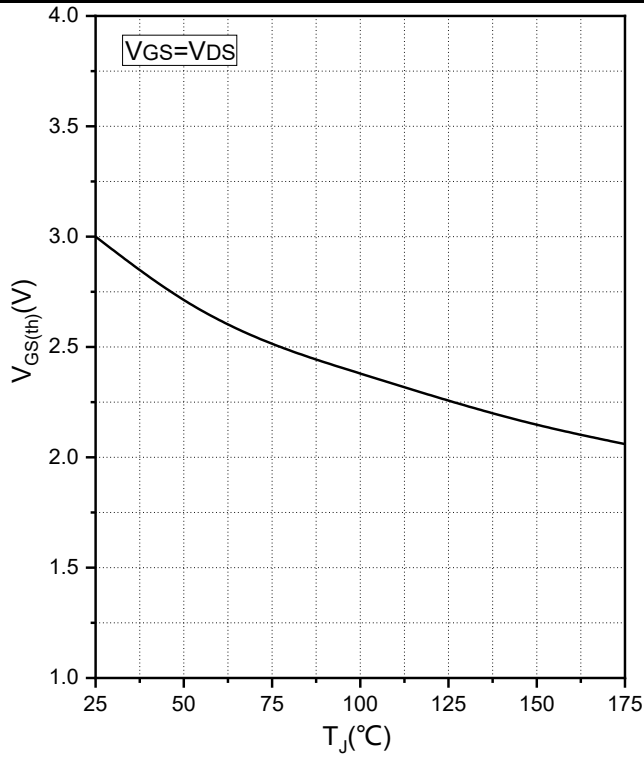


Fig.5 Gate-source threshold voltage

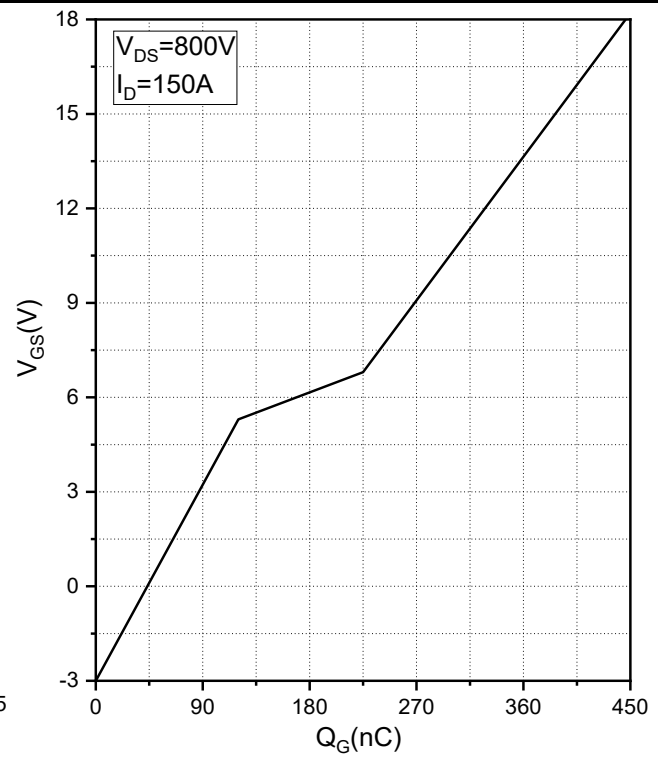


Fig.6 Gate charge characteristic

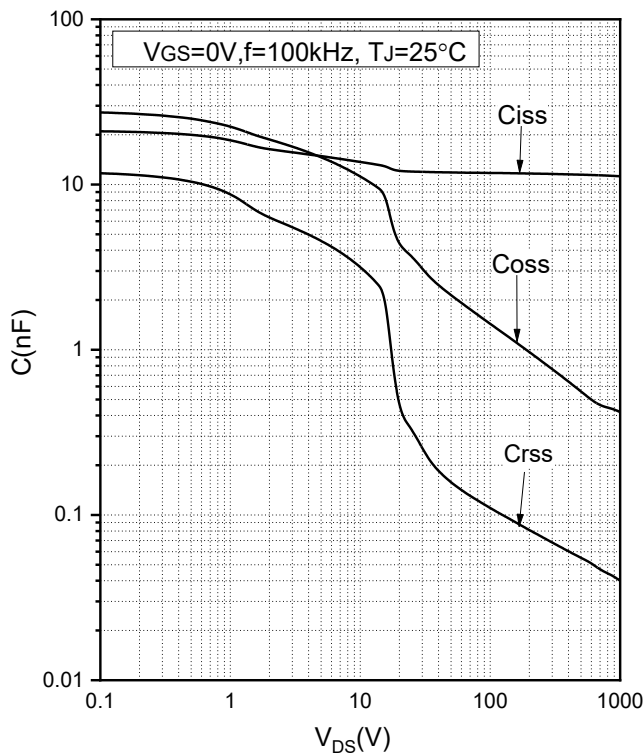


Fig.7 Capacity characteristic

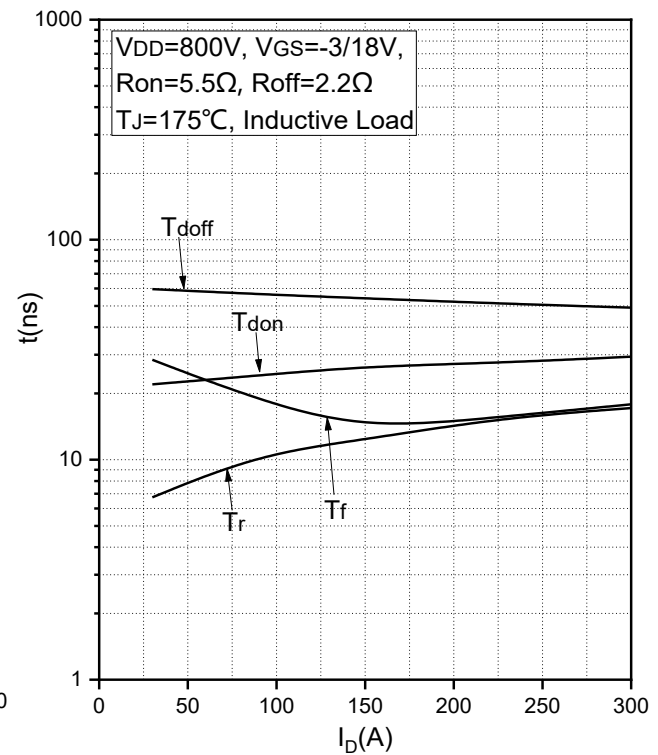
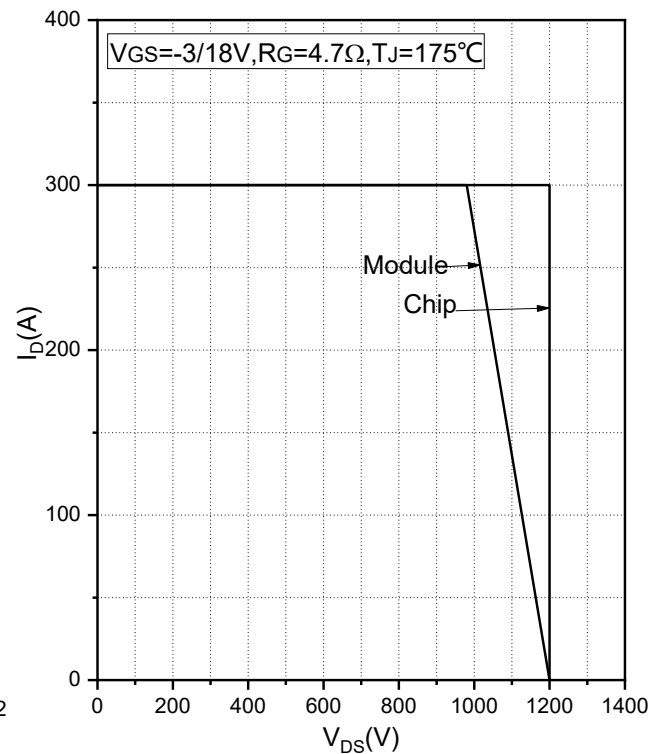
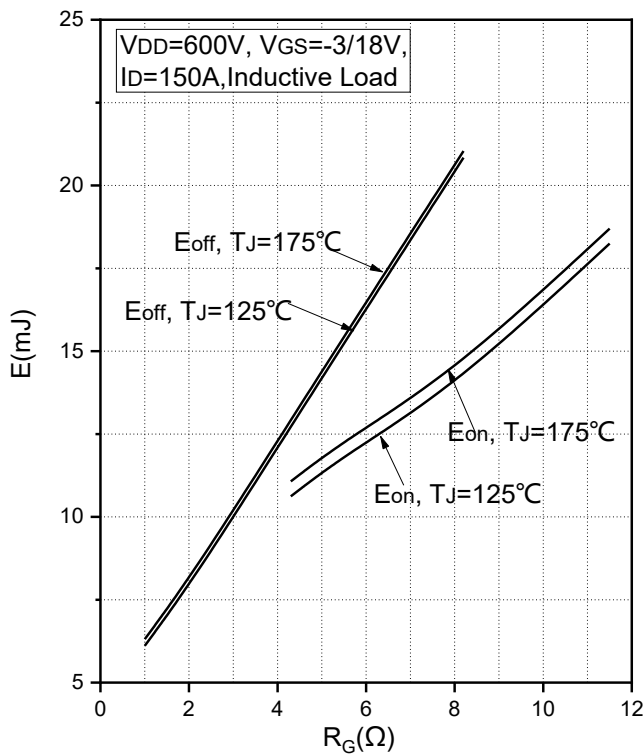
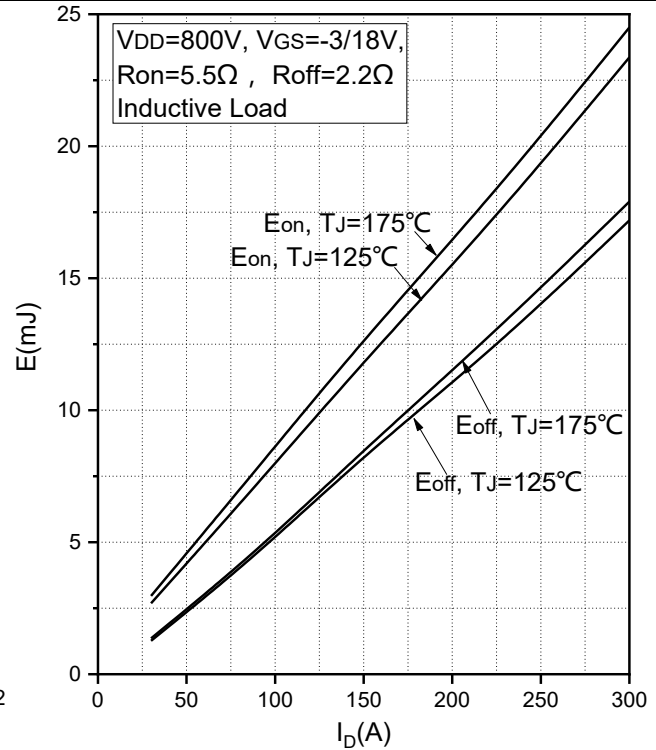
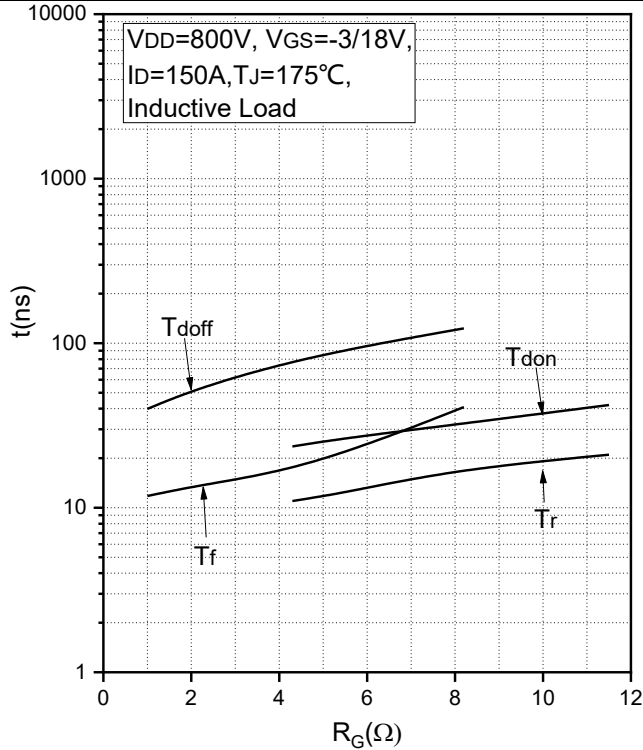


Fig.8 Typical Switching times vs Drain Current

MSC280HF120T1WH

SiC MOSFET Module Datasheet





MSC280HF120T1WH

SiC MOSFET Module Datasheet

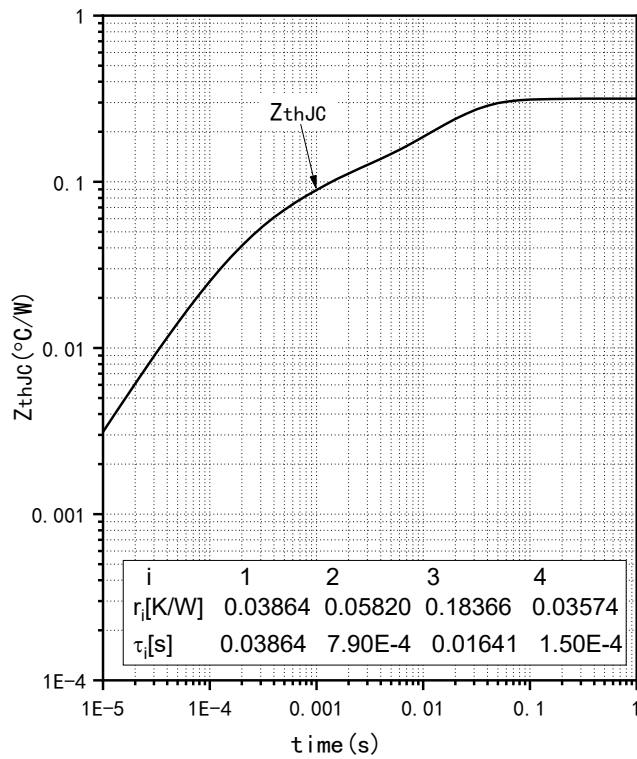


Fig.13 Transient Thermal Impedance (MOSFET)

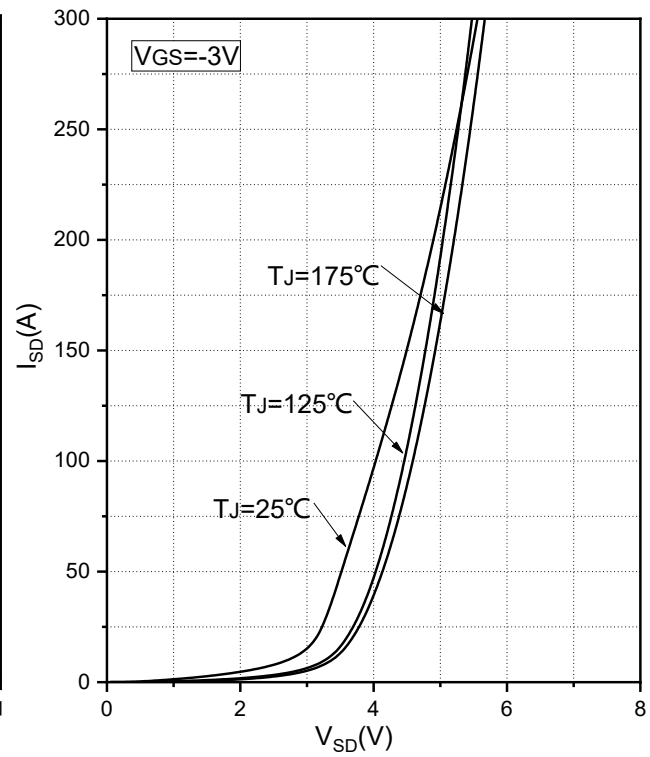
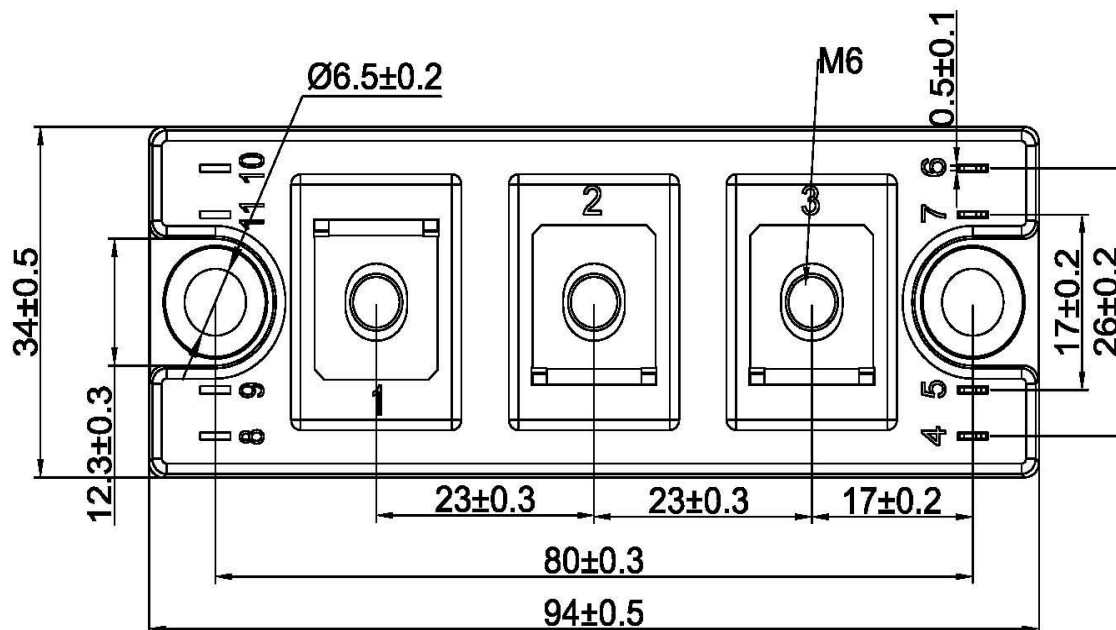


Fig.14 Typical Forward characteristic body diode



Internal Circuit:



MSC280HF120T1WH

SiC MOSFET Module Datasheet



Revision	Notes
01	Initial Release
02	Engineering Sample Datasheet

Announcement

Information in this document is believed to be accurate and reliable. However, NJSME does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to Make Changes

NJSME reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

The released datasheet would be issued with “REV.” + “alphabet characters”.