

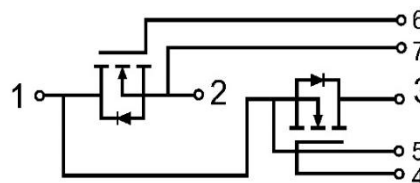
MSC420HF120T1WH

SiC MOSFET Module

Circuit Diagram

Features:

- $V_{DS}=1200V$ $R_{DS(on)}=4.60m\Omega$ SiC MOSFET Module
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Low Stray Inductance
- 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
MSC420HF120T1WH	T1W	MSC420HF120T1WH

MOSFET

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

V_{DS}	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}	$T_C=90^\circ C$	230	A
		$T_C=25^\circ C$	300	A
I_{DRM}	Repetitive peak drain current	T_p limited by T_{Jmax}	840	A
P_D	Maximum Power Dissipation	$T_C=25^\circ C, T_{Jmax}=175^\circ C$	710	W



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

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate threshold voltage	$I_D=100\text{mA}$, $V_{DS}=V_{GS}$	2.0	3.0	4.0	V
$R_{DS(on)}$	Drain-source on-resistance	$I_D=300\text{A}$,	$V_{GS}=18\text{V}$ $T_J=25^{\circ}\text{C}$	4.60	5.60	$\text{m}\Omega$
			$V_{GS}=18\text{V}$ $T_J=125^{\circ}\text{C}$	6.04		$\text{m}\Omega$
			$V_{GS}=18\text{V}$ $T_J=175^{\circ}\text{C}$	7.50		$\text{m}\Omega$
I_{DSS}	Drain-source leakage current	$V_{GS}=0\text{V}$, $V_{DS}=1200\text{V}$, $T_J=25^{\circ}\text{C}$			0.3	mA
I_{GSS}	Gate-source leakage current	$V_{GS}=20\text{V}$, $V_{DS}=0\text{V}$, $T_J=25^{\circ}\text{C}$			600	nA
C_{iss}	Input Capacitance	$V_{DS}=1000\text{V}$, $V_{GS}=0\text{V}$, $f=100\text{kHz}$		16.53		nF
C_{oss}	Output Capacitance			0.61		nF
C_{rss}	Reverse Transfer Capacitance			0.06		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{DD} =800V, I _D =300A, R _{Gon} =5.5Ω, V _{GS} =-3/18V, Inductive Load	T _J =25°C		129		ns	
			T _J =125°C		109			
			T _J =175°C		106			
t _r	Rise Time		T _J =25°C		57		ns	
			T _J =125°C		55			
			T _J =175°C		49			
t _{d(off)}	Turn-off Delay Time		V _{DD} =800V, I _D =300A, R _{Goff} =2.2Ω, V _{GS} =-3/18V, Inductive Load	T _J =25°C		246		ns
				T _J =125°C		276		
				T _J =175°C		289		
t _f	Fall Time	T _J =25°C			32		ns	
		T _J =125°C			35			
		T _J =175°C			37			
E _{on}	Turn-on Switching Loss	V _{DD} =800V, I _D =300A, R _{Gon} =5.5Ω, V _{GS} =-3/18V, di/dt=5900A/μs(T _J =175°C) Inductive Load		T _J =25°C		22		mJ
		T _J =125°C			24			
		T _J =175°C			25			



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E _{off}	Turn-off Switching Loss	V _{DD} =800V, I _D =300A, R _{Goff} =2.2Ω, V _{GS} =-3/18V, du/dt=8100V/μs(T _J =175°C) Inductive Load	T _J =25°C		15		mJ
			T _J =125°C		16		
			T _J =175°C		17		
Q _g	Total Gate Charge	V _{DD} =800V, I _D =300A V _{GS} =-3/18V	T _J =25°C		820		nC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		1.6		Ω
R _{θJC}	MOSFET Thermal Resistance: Junction-to-Case (per MOSFET)					0.211	°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		300	A
I _{SDM}	Body Diode Maximum Forward Current	t _p =1ms	840	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} =300A, V _{GS} =-3V	T _J =25°C	5.42	6.50	V
			T _J =125°C	5.20		
			T _J =175°C	5.52		

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Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 60s	2500			V
T _J	Maximum Junction Temperature		-40		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		4.0		6.0	
G	Weight			150		g

Ordering Information Table

Device code	M	SC	420	HF	120	T1W	H
	①	②	③	④	⑤	⑥	⑦

- ① - MOSFET Module
- ② - SiC MOSFET
- ③ - Rated Current (420=420A)
- ④ - Circuit Configuration:HF (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



Characteristic diagram

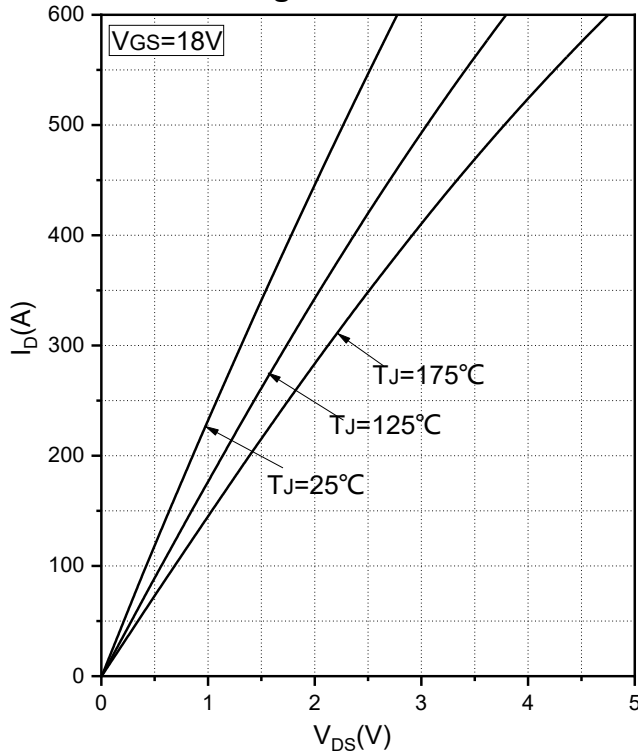


Fig.1 Typical Saturation Voltage Characteristics

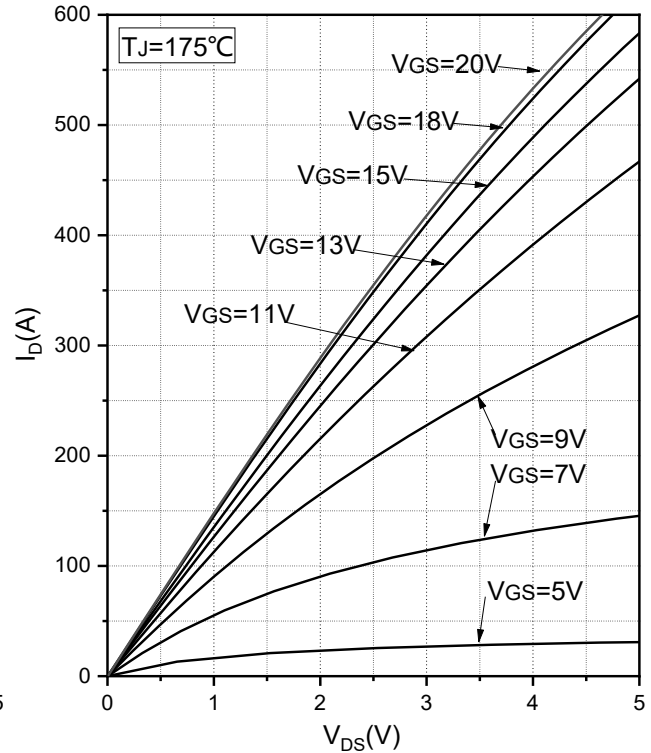


Fig.2 Typical Output Characteristics

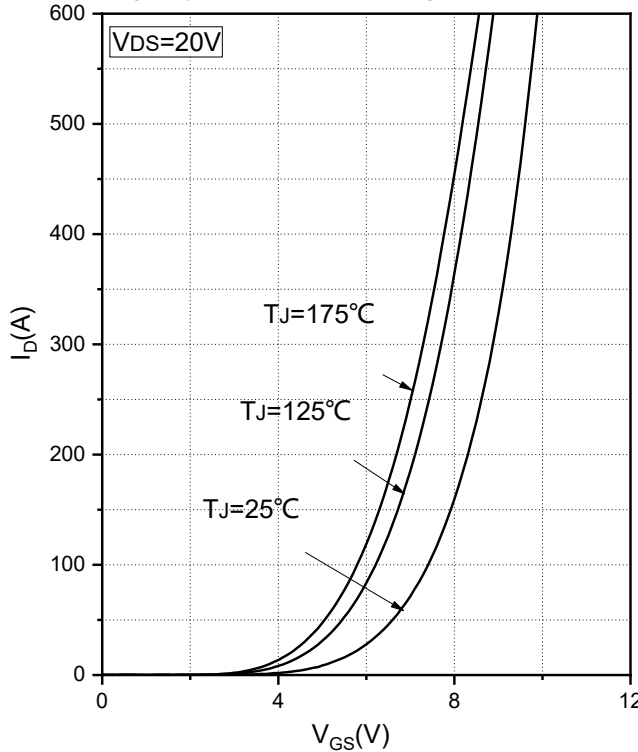


Fig.3 Transfer Characteristic

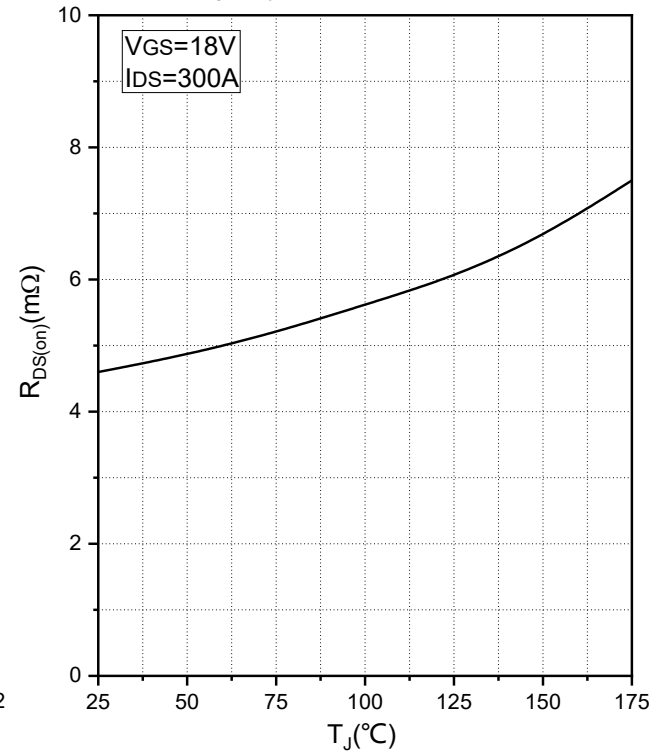


Fig.4 Drain source on-resistance

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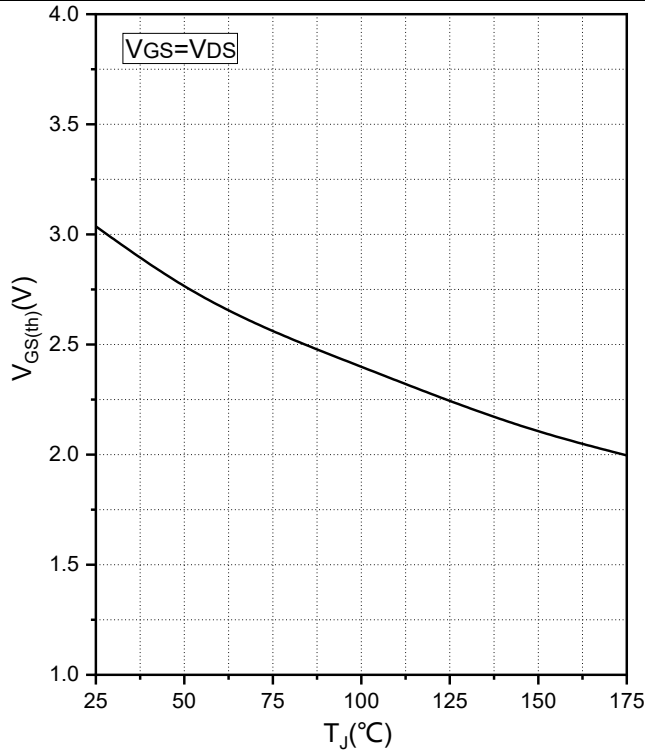


Fig.5 Gate-source threshold voltage

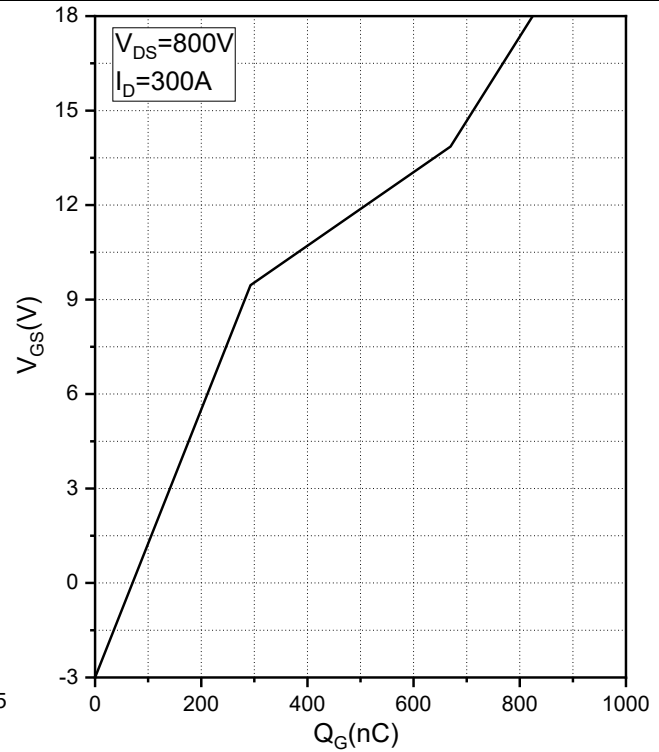


Fig.6 Gate charge characteristic

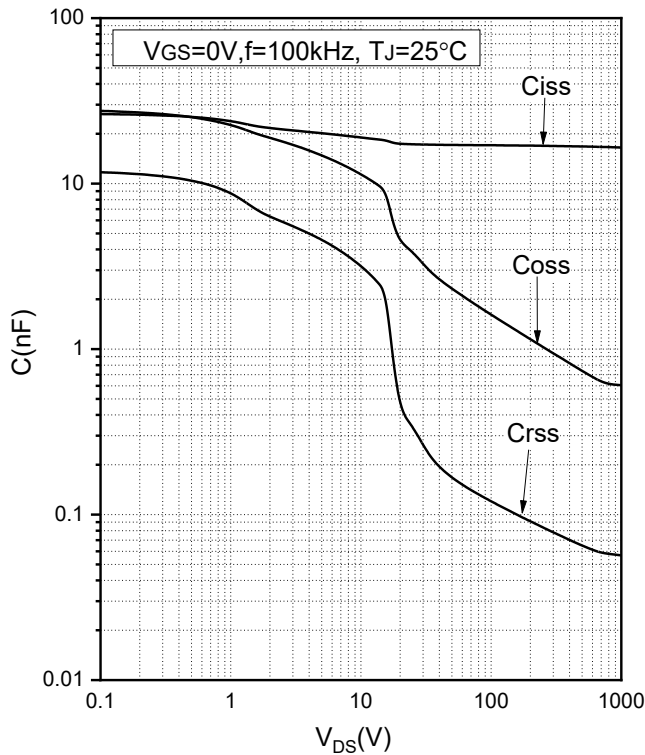


Fig.7 Capacity characteristic

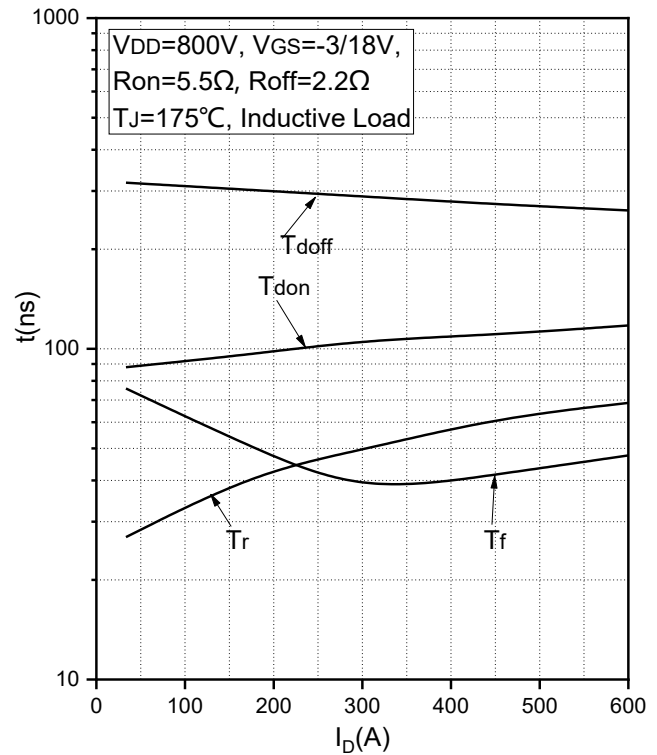
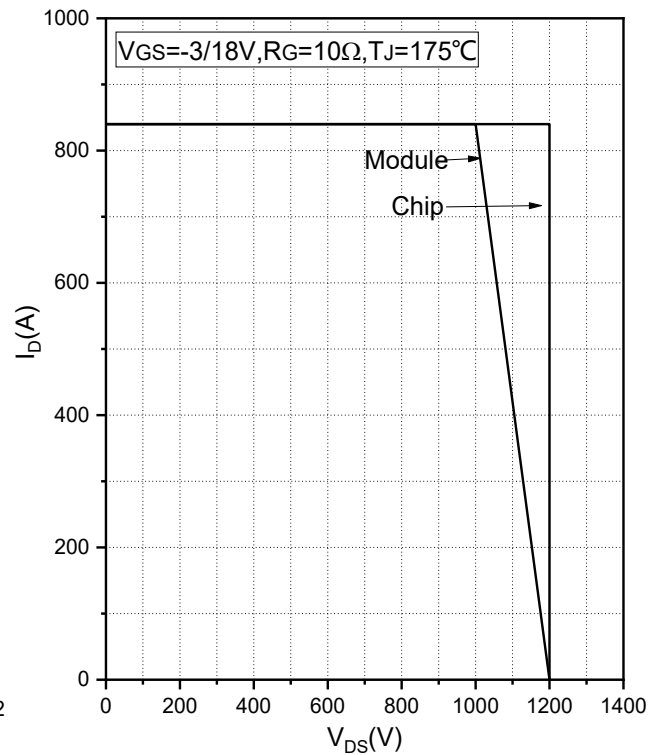
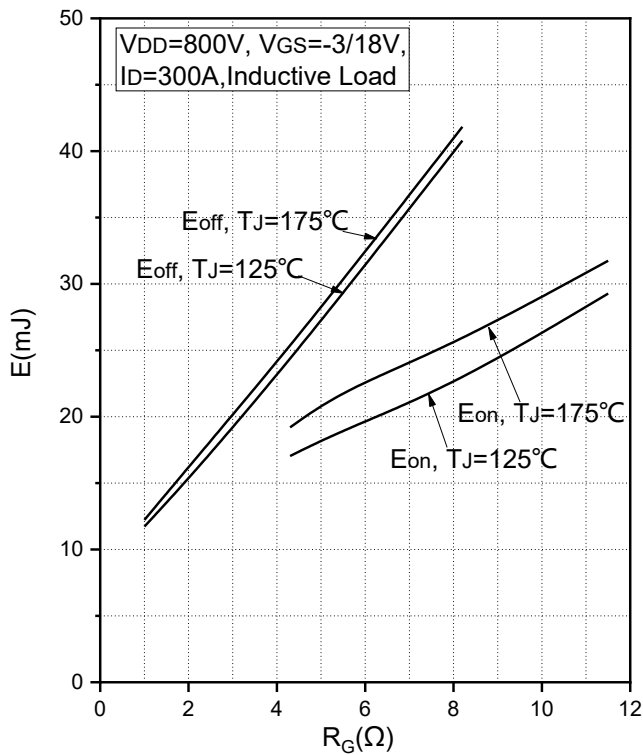
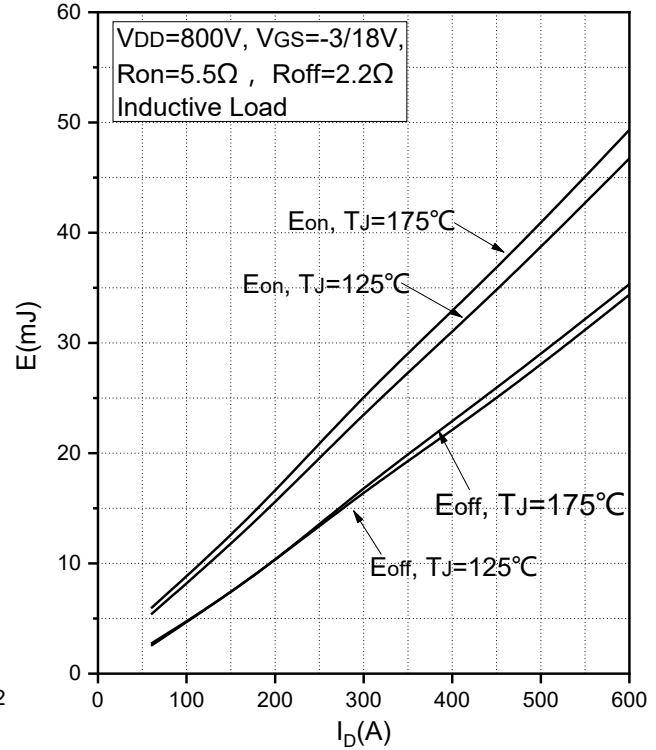
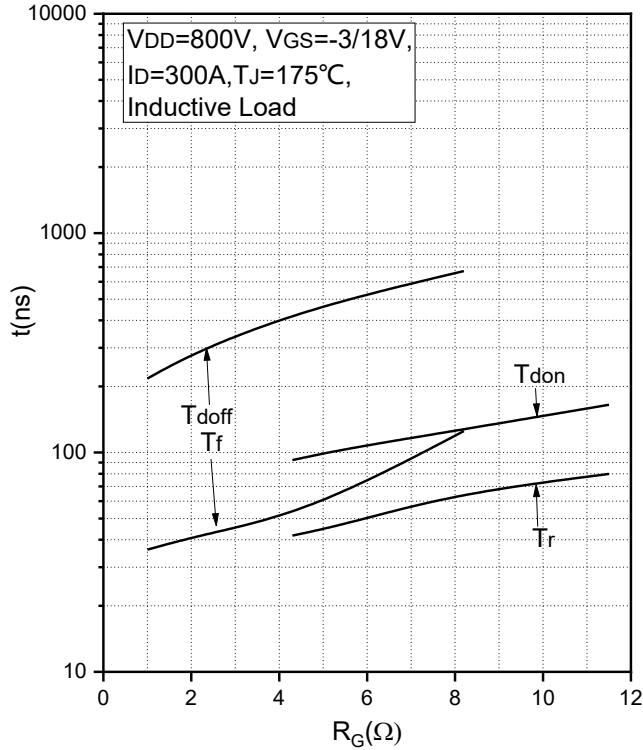


Fig.8 Typical Switching times vs Drain Current

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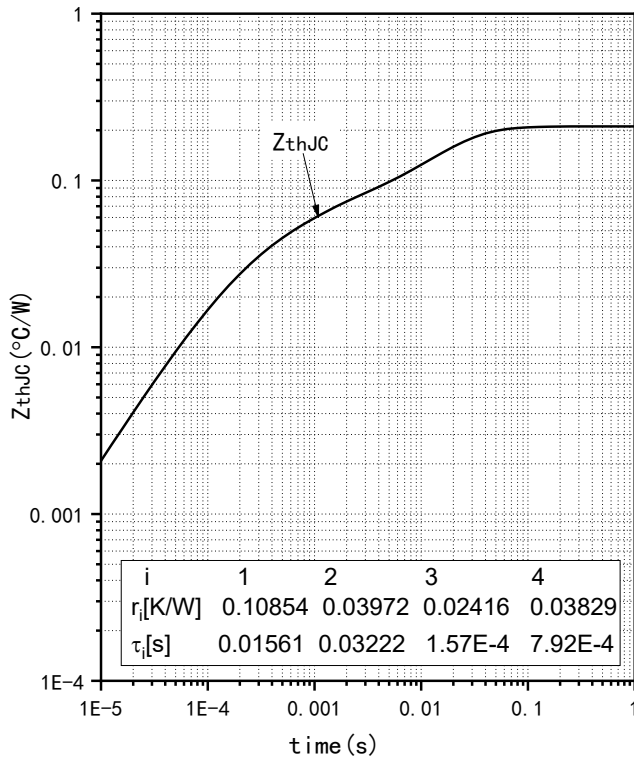


Fig.13 Transient Thermal Impedance (IGBT)

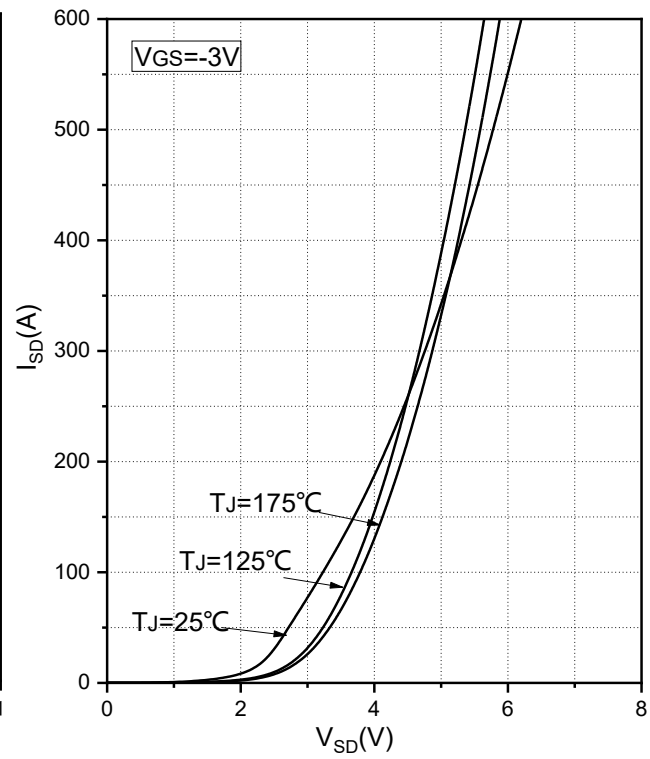
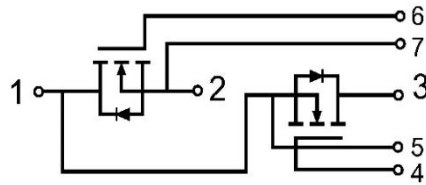


Fig.14 Typical Forward characteristic body diode

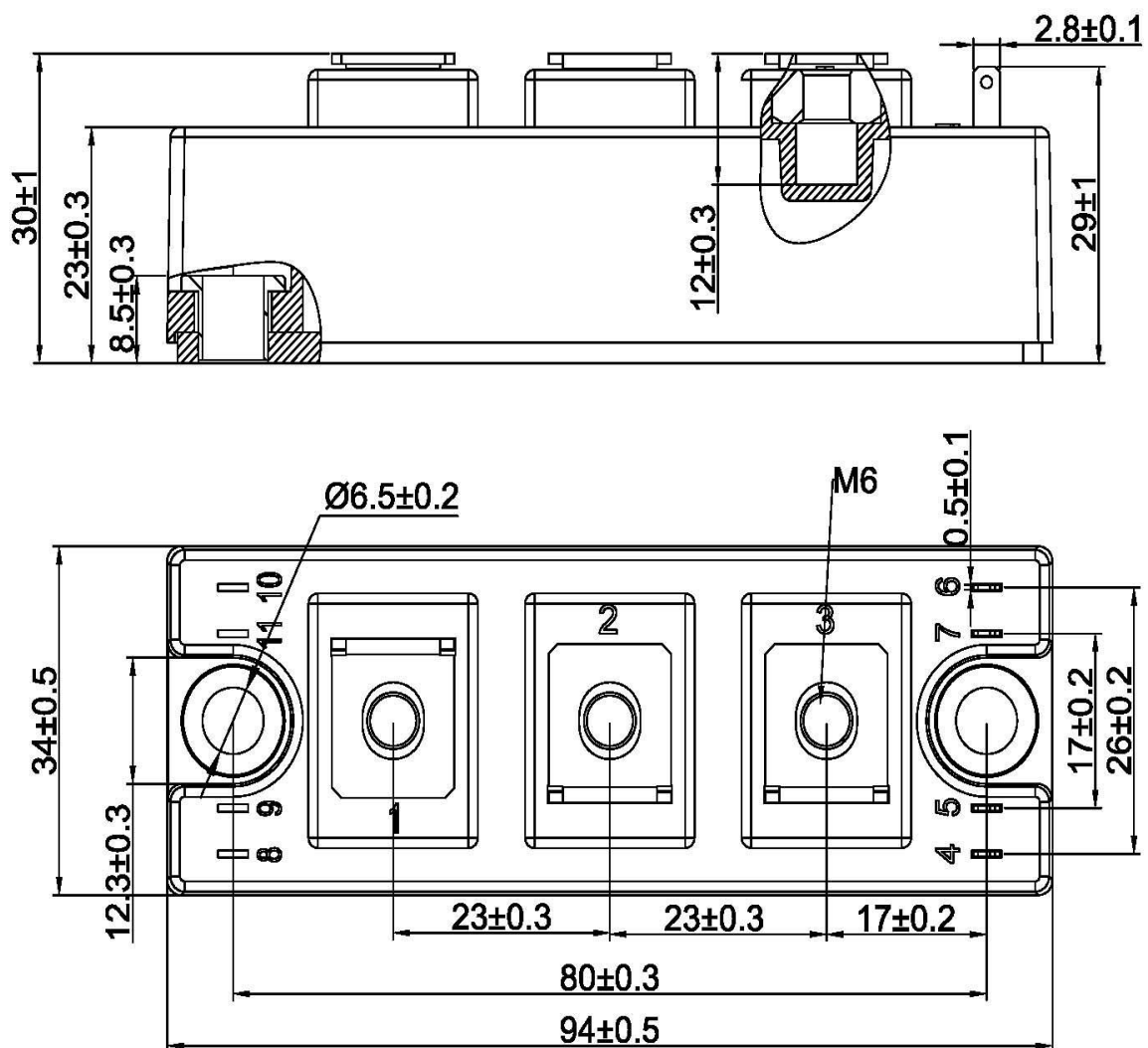
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Internal Circuit:



Package Outline (Unit: mm):



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Revision	Notes
01	Preliminary datasheet
02	Engineering Sample Datasheet

Announcement

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