

关键参数

Key Parameters

V_{DS}		1200	V
$R_{DS(on)}$	Typ.	1.6	mΩ
I_D	Max.	840	A
I_{DM}	Max.	1680	A

典型应用

Typical Applications

- 电动汽车 Automotive Applications
- 混合动力/纯电动车 Hybrid/Electrical Vehicles
- 电机驱动 Motor Drives

特点

Features

- 低开关损耗 Low Switching Losses
- 转模封装 Molded Package
- 低感设计 Low Inductance Design
- Si₃N₄ 衬板 Si₃N₄ AMB Substrate

电路结构

Circuit Configuration

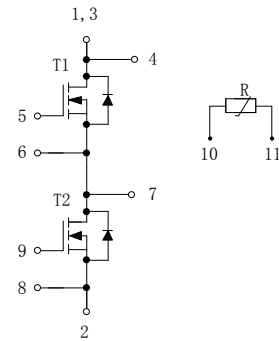


图 1.电路结构

Fig. 1 Circuit configuration

模块外形

Module Appearance

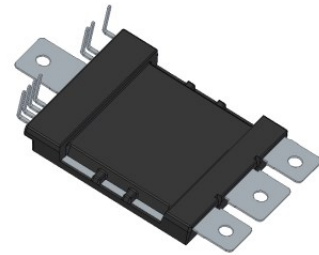


图 2. 模块外形

Fig. 2 Module appearance

模块标签说明

Module Label Code Instruction



数据位置 Data position	数据内容 Content of data
1--8	模块批次号 Module batch number
9--12	模块序列号 Module serial number

最大额定值
Absolute Maximum Ratings

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions	数值 Value	单位 Unit
V_{DS}	漏源极电压 Drain-source voltage	$V_{GS} = 0V, T_C = 25^\circ C$	1200	V
V_{GSmax}	栅源电压 Gate-source voltage	$T_C = 25^\circ C$	-8/+22	V
V_{GSop}	栅源电压 Gate-source voltage	$T_C = 25^\circ C$	-4/+18	V
I_D	额定漏极电流 Rating drain current	$T_F = 25^\circ C, T_{vj\ max} = 175^\circ C$	840	A
I_{DM}	漏极峰值电流 Peak drain current	$t_P = 1ms$	1680	A
P_{max}	晶体管部分最大损耗 Max. transistor power dissipation	$T_F = 65^\circ C, T_{vj\ max} = 175^\circ C$	1400	W
V_{isol}	绝缘电压(模块) Isolation voltage – per module	短接所有端子，端子与基板间施加电压 (Connected terminals to baseplate), RMS, f=0 Hz, t=1 sec, $T_C = 25^\circ C$	4200	V

热和机械数据
Thermal & Mechanical Data

参数 Symbol	说明 Explanation	值 Value	单位 Unit
爬电距离 Creepage distance	端子-散热器 Terminal to heatsink	7.3	mm
	端子-端子 Terminal to terminal	7.3	mm
绝缘间隙 Clearance	端子-散热器 Terminal to heatsink	7.3	mm
	端子-端子 Terminal to terminal	4	mm
相对漏电起痕指数 CTI (Comparative tracking index)		>400	

热和机械数据

Thermal & Mechanical Data

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
$R_{th(J-F)}$ MOSFET	MOSFET 热阻 Thermal resistance –MOSFET	冷却液: 50%乙二醇溶液; $\Delta V/\Delta t=2.67\text{ dm}^3/\text{min}$; $T_F = 65\text{ }^\circ\text{C}$ Cooling Fluid: 50% water / 50% ethylene glycol; $\Delta V/\Delta t=2.67\text{ dm}^3/\text{min}$; $T_F = 65\text{ }^\circ\text{C}$		77		K / kW
ΔP	冷却液流阻 Pressure drop in cooling circuit	冷却液: 50%乙二醇溶液; $\Delta V/\Delta t=2.67\text{ dm}^3/\text{min}$; $T_F = 25\text{ }^\circ\text{C}$ Cooling Fluid: 50% water / 50% ethylenglycol; $\Delta V/\Delta t=2.67\text{ dm}^3/\text{min}$; $T_F = 25\text{ }^\circ\text{C}$		68		mbar
P	冷却液最大压力 Maximum pressure in cooling circuit				2.5	bar
$T_{vj\text{ op}}$	工作结温 Operating junction temperature		-40		175	$^\circ\text{C}$
T_{stg}	存储温度 Storage temperature range		-40		125	$^\circ\text{C}$
M	安装力矩 Screw torque	电路互连用– M5 Electrical connections – M5	3		6	Nm

热敏电阻数据

PTC-Thermistor Data

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
R	额定电阻值 Rated resistance	$T_C = 0\text{ }^\circ\text{C}$	997.7	1000	1002.3	Ω
		$T_C = 150\text{ }^\circ\text{C}$	1565.4	1573.3	1581.1	Ω
TC_R	温度系数 Temperature coefficient			0.385		%/K
T_{SH}	自发热 Self heating	$T_C = 0\text{ }^\circ\text{C}$ $I_m=0.1\ldots0.3\text{ mA}$		0.4		K/mW

电特性值
Electrical Characteristics

除非特别声明，否则 $T_C = 25\text{ }^{\circ}\text{C}$
 $T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise stated

符号 Symbol	参数名称 Parameter	条件 Test Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
I_{DSS}	零栅压漏极电流 Zero gate voltage drain current	$V_{GS} = 0V, V_{DS} = V_{DSS}$			100	μA
		$V_{GS} = 0V, V_{DS} = V_{DSS}, T_{vj} = 150\text{ }^{\circ}\text{C}$			500	μA
		$V_{GS} = 0V, V_{DS} = V_{DSS}, T_{vj} = 175\text{ }^{\circ}\text{C}$			1000	μA
I_{GSS}	栅极漏电流 Gate leakage current	$V_{GS} = -8/+22V, V_{DS} = 0V$			500	nA
$V_{GS(th)}$	栅极-源极阈值电压 Gate threshold voltage	$I_D = 80mA, V_{GS} = V_{DS}$	2.0	2.7	3.4	V
$R_{DS(on)}^{(*)1}$	漏极-源极通态电阻 Drain-source on-state resistance	$V_{GS} = 18V, I_D = 840A$		1.6		m Ω
		$V_{GS} = 18V, I_D = 840A, T_{vj} = 150\text{ }^{\circ}\text{C}$		2.2		m Ω
		$V_{GS} = 18V, I_D = 840A, T_{vj} = 175\text{ }^{\circ}\text{C}$		2.6		m Ω
g_{fs}	跨导 Forward transconductance	$V_{DS} = 20V, I_D = 840A$		380		S
$V_{SD}^{(*)1}$	二极管正向电压 Diode forward voltage	$I_{SD} = 840A, V_{GS} = -4V$		5.5		V
		$I_{SD} = 840A, V_{GS} = -4V, T_{vj} = 150\text{ }^{\circ}\text{C}$		5.1		V
		$I_{SD} = 840A, V_{GS} = -4V, T_{vj} = 175\text{ }^{\circ}\text{C}$		5		V
I_{SC}	短路电流 Short circuit current	$T_{vj} = 175\text{ }^{\circ}\text{C}, V_{DD} = 800V,$ $V_{GS} \leq 18V, t_p \leq TBD\text{ }\mu s,$ $V_{DS(max)} = V_{DSS} - L^{(*)2} \times di/dt,$ IEC 60747-8		TBD		A

注意: 1.(*)1 表示该参数的测试点为辅助母排端子((*)1 indicates it is measured at the auxiliary busbar terminal),
Note: 2.(*)2 表示 L 是电路杂散电感加上 L_{SDS} ((*)3 indicates L is the circuit stray inductance plus L_{SDS}).

电特性值

Electrical Characteristics

除非特别声明，否则 $T_C = 25\text{ }^{\circ}\text{C}$ $T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise stated

符号 Symbol	参数名称 Parameter	条件 Test Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
C_{iss}	输入电容 Input capacitance	$V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$, $f = 100\text{kHz}$		42.3		nF
Q_g	栅极电荷 Gate charge	-4/+18V		1.89		μC
C_{rss}	反向传输电容 Reverse transfer capacitance	$V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$, $f = 100\text{kHz}$		0.12		nF
L_{sDS}	模块电感 Module inductance			6.0		nH
$R_{DD'+SS'}$	模块引线电阻，端子-芯片 Module lead resistance, terminal-chip			0.5		m Ω
R_{Gint}	内部栅极电阻 Internal gate resistor			0.4		Ω

电特性值

Electrical Characteristics

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions		最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
$t_{d(off)}$	关断延迟时间 Turn-off delay time	I_D =840A, V_{DS} = 800V, V_{GS} = -4/+18V, $R_{G(OFF)}$ = 3.3Ω, L_S = 19nH, dv/dt =12000V/μs (T_{vj} = 175 °C).	T_{vj} = 25 °C		334		ns
			T_{vj} = 150 °C		380		
			T_{vj} = 175 °C		420		
t_f	下降时间 Fall time		T_{vj} = 25 °C		48		ns
			T_{vj} = 150 °C		55		
			T_{vj} = 175 °C		59		
E_{OFF}	关断损耗 Turn-off energy loss		T_{vj} = 25 °C		43		mJ
			T_{vj} = 150 °C		45		
			T_{vj} = 175 °C		48		
$t_{d(on)}$	开通延迟时间 Turn-on delay time	T_{vj} = 25 °C		95		ns	
		T_{vj} = 150 °C		70			
		T_{vj} = 175 °C		66			
t_r	上升时间 Rise time	T_{vj} = 25 °C		152		ns	
		T_{vj} = 150 °C		125			
		T_{vj} = 175 °C		122			
E_{ON}	开通损耗 Turn-on energy loss	T_{vj} = 25 °C		116		mJ	
		T_{vj} = 150 °C		103			
		T_{vj} = 175 °C		104			
Q_{rr}	二极管反向恢复电荷 Diode reverse recovery charge	T_{vj} = 25 °C		2		μC	
		T_{vj} = 150 °C		5			
		T_{vj} = 175 °C		6			
I_{rr}	二极管反向恢复电流 Diode reverse recovery current	T_{vj} = 25 °C		135		A	
		T_{vj} = 150 °C		170			
		T_{vj} = 175 °C		195			
E_{rec}	二极管反向恢复损耗 Diode reverse recovery energy	T_{vj} = 25 °C		0.82		mJ	
		T_{vj} = 150 °C		1.45			
		T_{vj} = 175 °C		1.88			

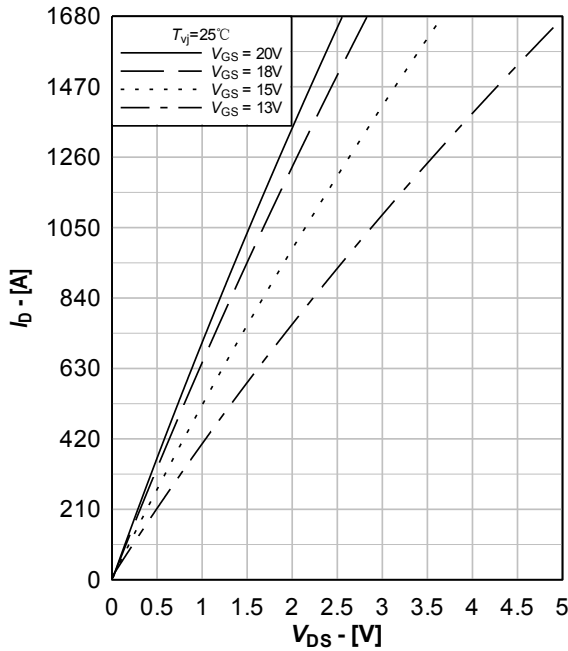


图 3. MOSFET 输出特性典型曲线, $I_D = f(V_{DS})$

Fig.3 Typical MOSFET output characteristics, $I_D = f(V_{DS})$

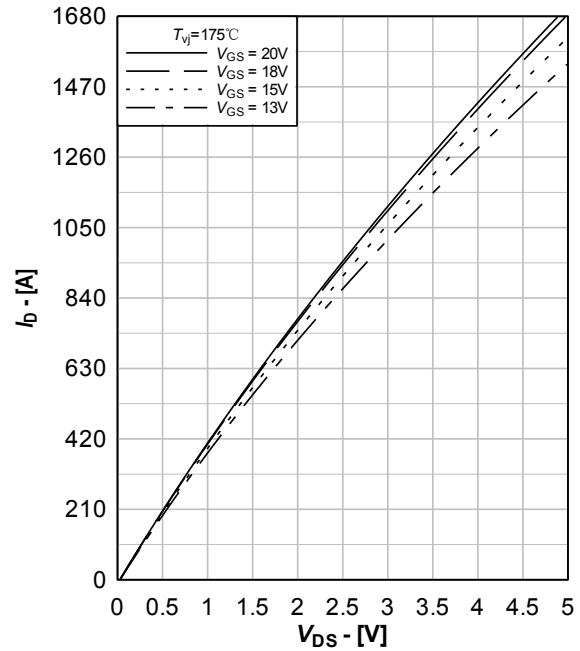


图 4. MOSFET 输出特性典型曲线, $I_D = f(V_{DS})$

Fig.4 Typical MOSFET output characteristics, $I_D = f(V_{DS})$

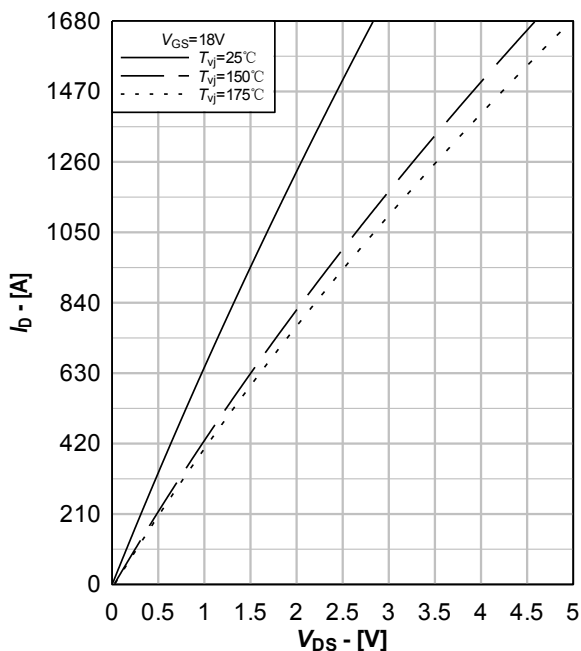


图 5. MOSFET 输出特性典型曲线, $I_D = f(V_{DS})$

Fig.5 Typical MOSFET output characteristics, $I_D = f(V_{DS})$

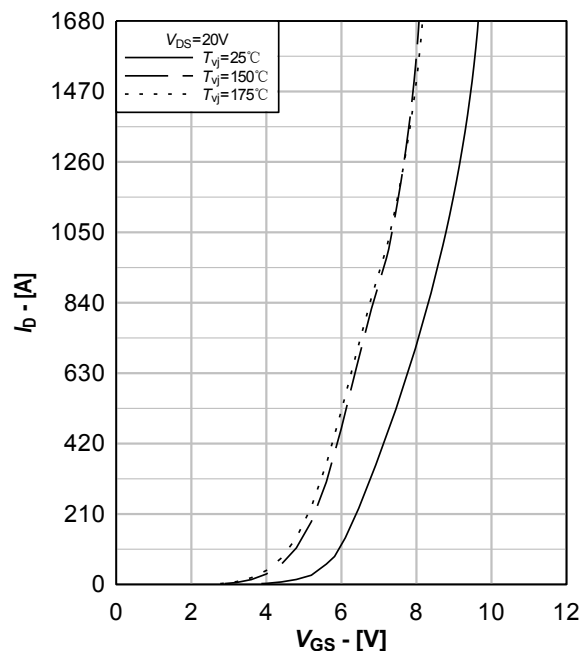


图 6. MOSFET 传输特性典型曲线, $I_D = f(V_{GS})$

Fig.6 Typical MOSFET transfer characteristics, $I_D = f(V_{GS})$

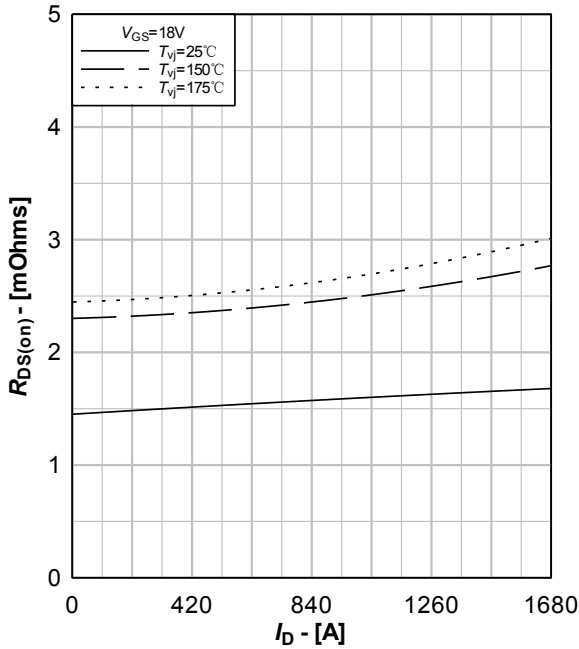

图 7. 导通电阻典型曲线, $R_{DS(on)} = f(I_D)$

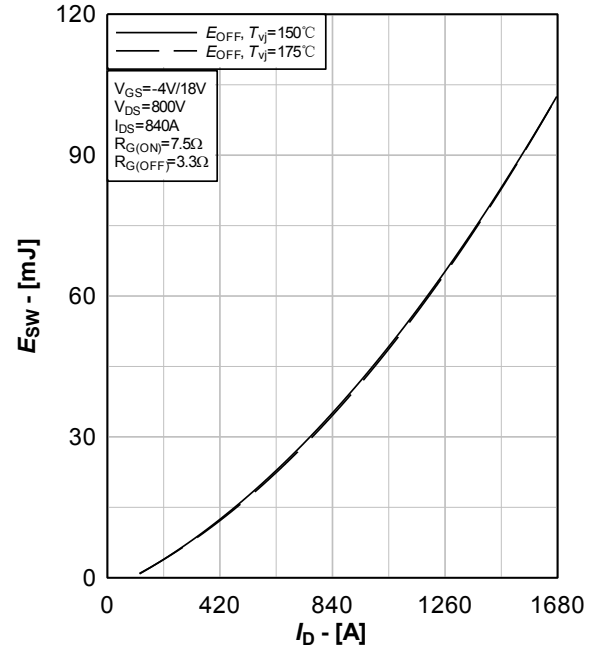
Fig.7 Typical On-Resistance characteristics, $R_{DS(on)} = f(I_D)$

图 8. MOSFET 开关损耗典型曲线, $E_{off} = f(I_C)$

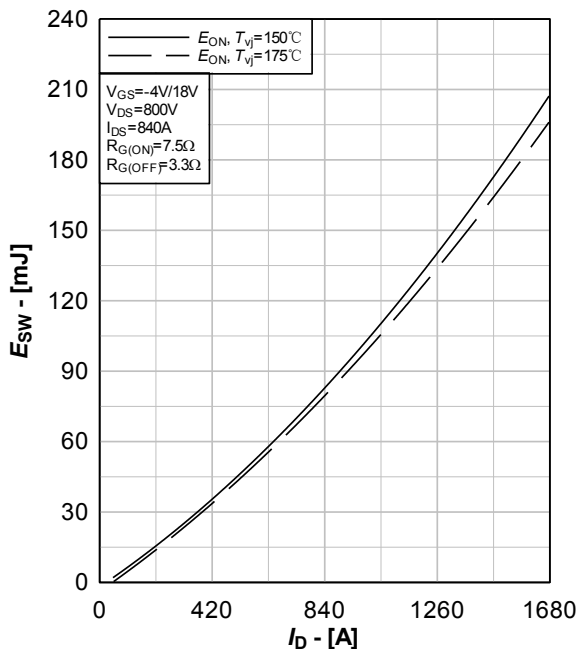
Fig.8 Typical MOSFET switching energy, $E_{off} = f(I_C)$

图 9. MOSFET 开关损耗典型曲线, $E_{on} = f(I_C)$

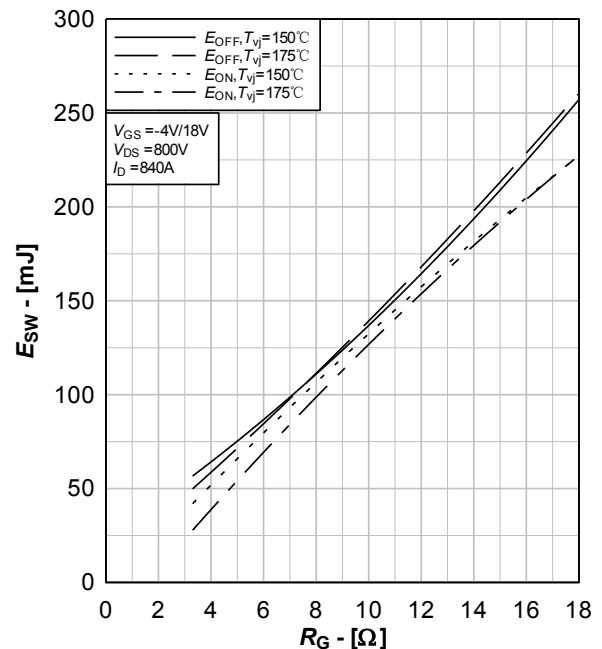
Fig.9 Typical MOSFET switching energy, $E_{on} = f(I_C)$

图 10. MOSFET 开关损耗典型曲线, $E_{on} = f(R_G)$, $E_{off} = f(R_G)$

Fig.10 Typical MOSFET switching energy, $E_{on} = f(R_G)$, $E_{off} = f(R_G)$

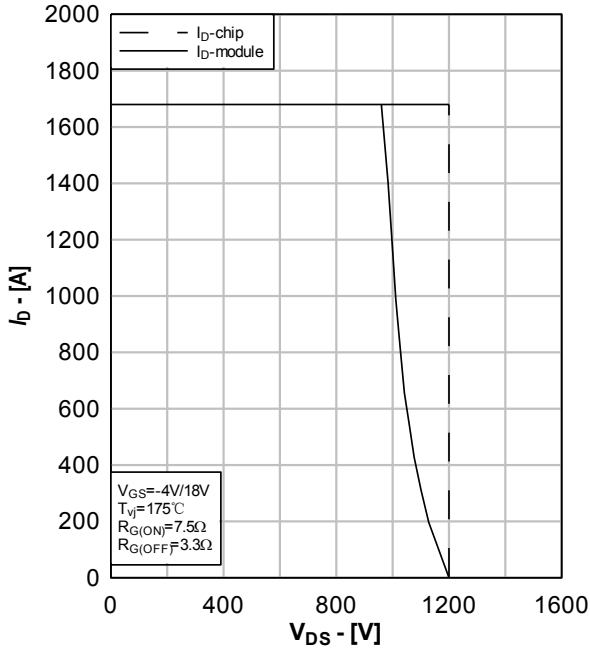


图 11. MOSFET 反偏安全工作区, $I_D = f(V_{DS})$

Fig.11 Reverse bias safe operating area of MOSFET, $I_D = f(V_{DS})$

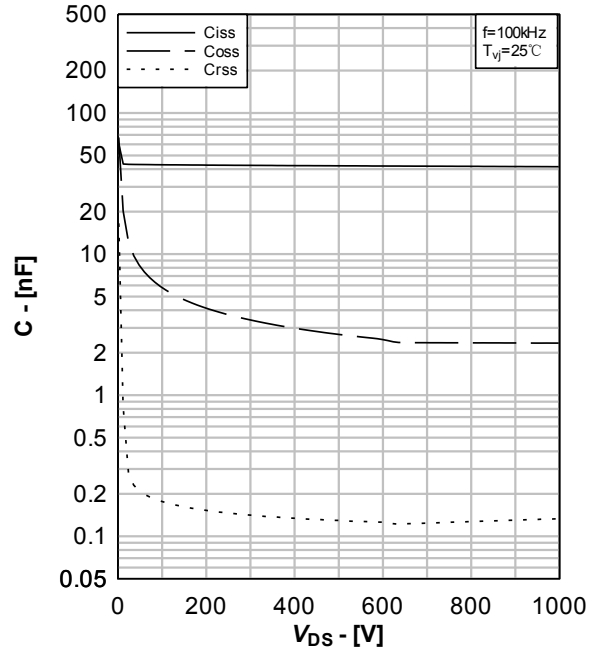


图 12. 电容特性典型曲线, $C = f(V_{DS})$

Fig.12 Typical capacity characteristic, $C = f(V_{DS})$

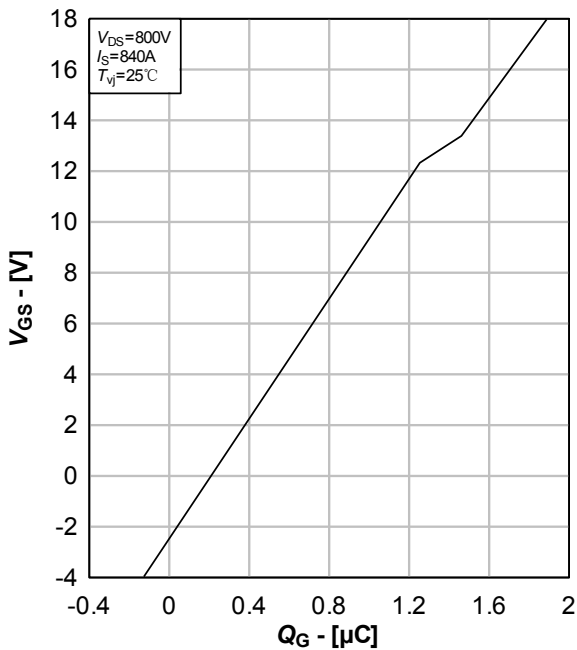


图 13. 栅极电荷特性典型曲线, $V_{GS} = f(Q_G)$

Fig.13 Typical gate charge characteristic, $V_{GS} = f(Q_G)$

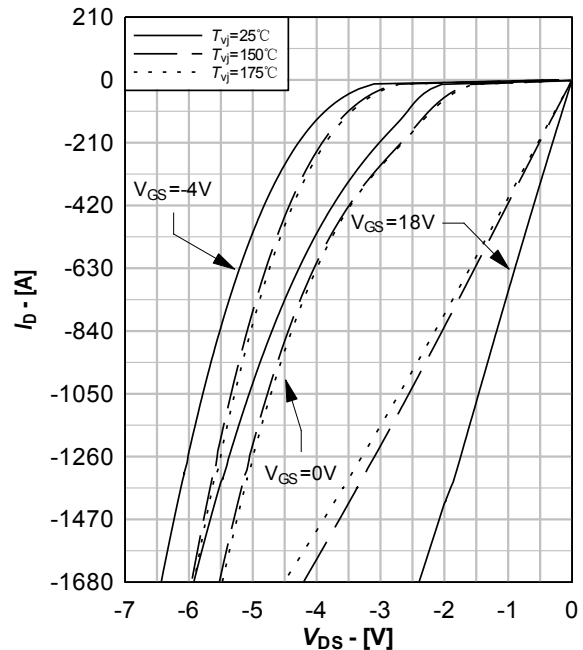


图 14. 体二极管及第三象限输出特性典型曲线, $I_D = f(V_{DS})$

Fig.14 Typical body diode output and 3rd quadrant characteristic, $I_D = f(V_{DS})$

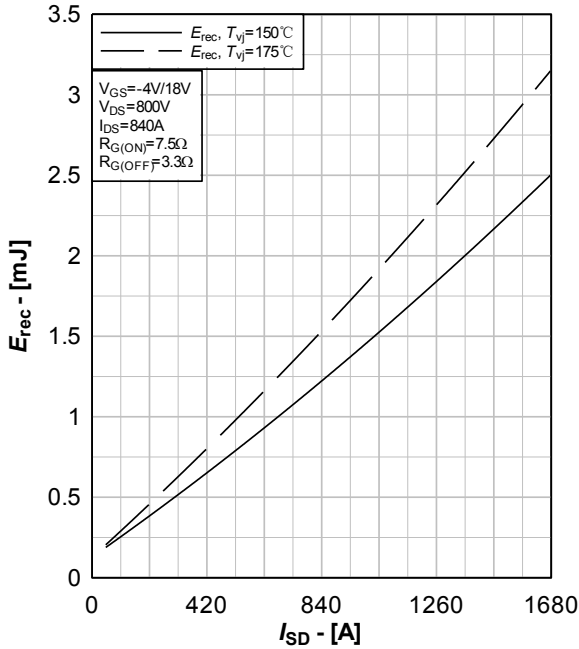

 图 15. 体二极管反向恢复损耗典型曲线, $E_{rec}=f(I_{SD})$

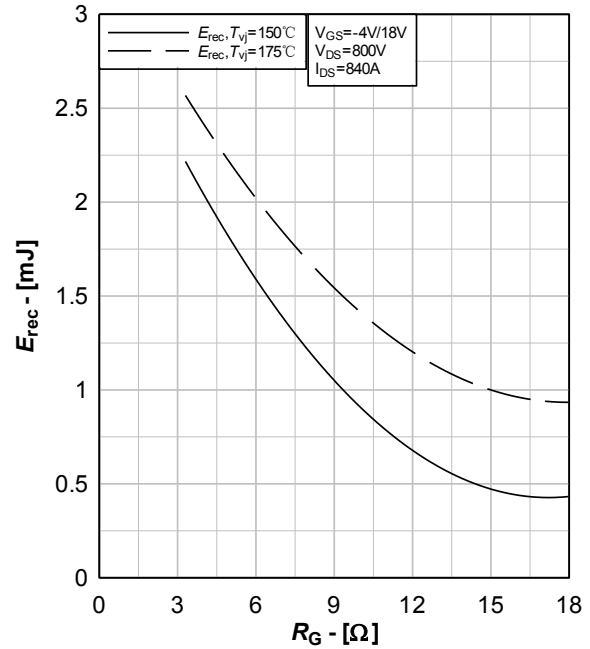
 Fig.15 Typical body diode switching loss E_{rec} , $E_{rec}=f(I_{SD})$

 图 16. 体二极管反向恢复损耗典型曲线, $E_{rec}=f(R_G)$

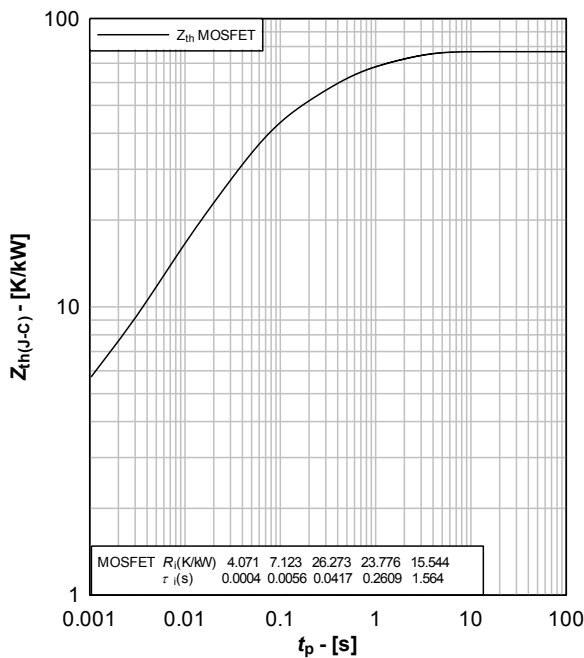
 Fig.16 Typical body diode switching loss E_{rec} , $E_{rec}=f(R_G)$

 图 17. 瞬态热阻抗曲线, $Z_{th(J-C)} = f(t_p)$

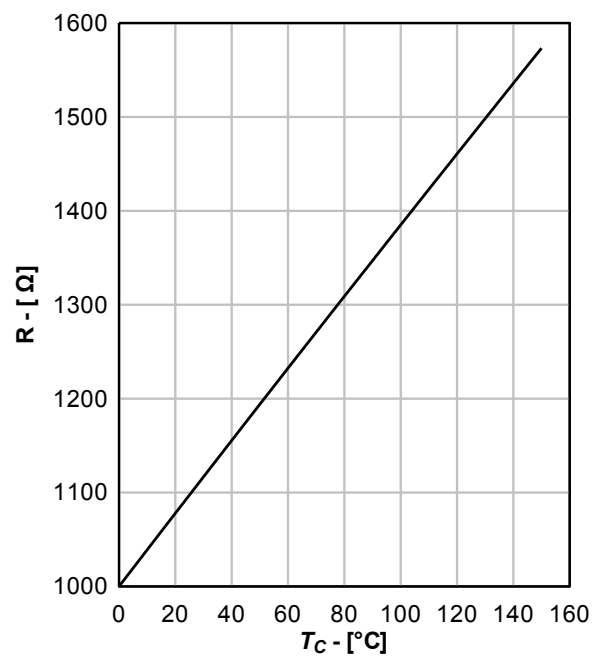
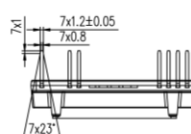
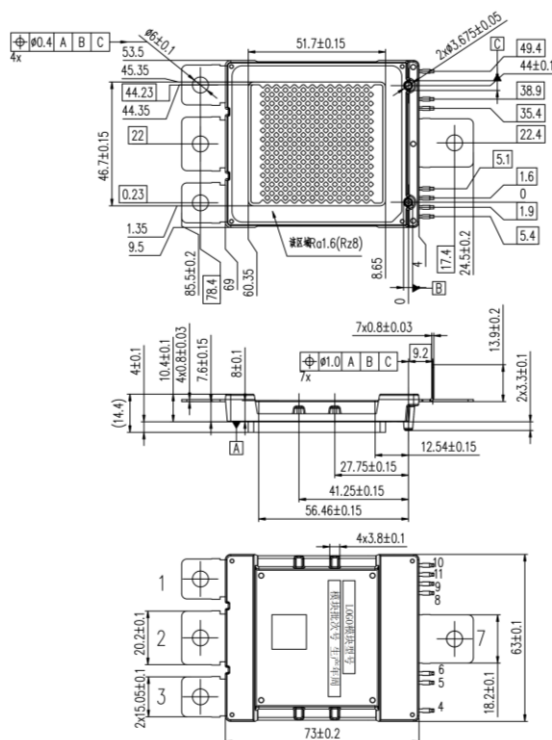
 Fig.17 Transient thermal impedance, $Z_{th(J-C)} = f(t_p)$

 图 18. 热敏电阻典型特性曲线, $R = f(T_C)$

 Fig.18 Typical PTC thermistor characteristic, $R = f(T_C)$



技术要求

1、未注尺寸公差，参照GB/T-14486-2008《塑料模塑件尺寸公差》

MT5级，参照如下：

- (a) $X < 10 \pm 0.14$ (b) $10 < X < 30 \pm 0.25$;
(c) $30 < X < 50 \pm 0.32$ (d) $50 < X < 100 \pm 0.5$;

2、环保要求满足RoHS;

重量 Weight: 209 g

模块外观类型 Module outline code: L5

图 19. 模块外观尺寸

Fig. 19 Module outlines

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