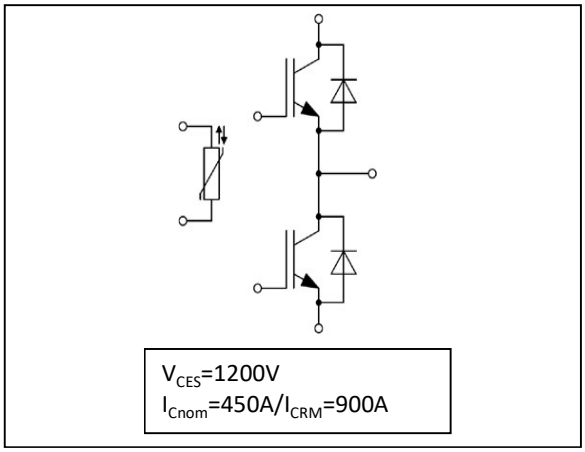
1200V 450A IGBT Half Bridge Module

1200V 450A IGBT 半桥模块



Features:

- ☐ 1200V Trench+ Field Stop technology
- ☐ Freewheeling diodes with fast and soft reverse recovery
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ Low switching losses
- ☐ Short circuit ruggedness

产品特性：

- ☐ 1200V 沟槽栅+场截止技术
- ☐ 快速的软恢复特性续流二极管
- ☐ 导通压降具有正温度系数
- ☐ 低开关损耗
- ☐ 良好的短路稳定性

Typical Applications:

- ☐ Motor/Servo Drives
- ☐ Wind Turbines Converters
- ☐ PV Inverters
- ☐ Energy Storage Converters
- ☐ UPS

典型应用：

- ☐ 电机/伺服驱动器
- ☐ 风电变流器
- ☐ 光伏逆变器
- ☐ 储能变流器
- ☐ 不间断电源

Package / 封装

Item	Symbol	Conditions	Values	Unit
绝缘测试电压 Isolation test voltage	V_{ISOL}	RMS, f = 50 Hz, t =1 min	3.0	kV
模块基板材料 Material of module baseplate			Cu	
内部绝缘 Internal isolation		基本绝缘 (class 1, IEC 61140) Basic insulation (class 1, IEC 61140)	Al_2O_3	
爬电距离 Creepage distance	d_{Creep}	端子-散热片/terminal to heatsink	14.5	mm
	d_{Creep}	端子-端子/terminal to terminal	13.0	
电气间隙 Clearance	d_{Clear}	端子-散热片/terminal to heatsink	12.5	mm
	d_{Clear}	端子-端子/terminal to terminal	10.0	
相对电痕指数 Comparative tracking index	CTI		＞200	

Item	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
杂散电感，模块 Stray inductance module	L_{sCE}			20		nH
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	$R_{CC'+EE'}$	T_C=25℃		1.10		mΩ
储存温度 Storage temperature	T_{stg}		-40		125	℃
模块安装的安装扭矩 Mounting torque for module mounting	M5		3		6	Nm
端子联接扭矩 Terminal connection torque	M6		3		6	Nm
重量 Weight	G			335		g

IGBT

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions		Values	Unit
集电极－发射极电压 Collector-emitter Voltage	V_{CES}		T_{vj}=25℃	1200	V
栅极－发射极电压 Maximum gate-emitter voltage	V_{GES}			±20	V
瞬态栅极－发射极电压 Transient gate-emitter voltage	V_{GES}	t_p≤10μs,D=0.01		±30	V
连续集电极直流电流 Continuous DC collector current	I_C		T_C=25℃	675	A
			T_C=100℃	450	
最大脉冲集电极电流 Pulsed collector current,tp limited by T_{jmax}	I_{Cpulse}			900	A
功率损耗 Power dissipation	P_{tot}			1666	W

Characteristic Values / 特征值

Item	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
集电极－发射极饱和电压 Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=450A, V_{GE}=15V	T_{vj}=25℃		1.60	2.20	V
			T_{vj}=125℃		1.80		
			T_{vj}=150℃		1.88		
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	V_{CE}=V_{GE}, I_C=18mA		4.7	5.5	6.3	V
集电极-发射极截止电流 Collector-emitter cut-off current	I_{CES}	V_{CE}=1200V, V_{GE}=0V	T_{vj}=25℃			100	μA
			T_{vj}=150℃			5	mA
栅极-发射极漏电流 Gate-emitter leakage current	I_{GES}	V_{CE}=0V,V_{GE}=±20V, T_{vj}=25℃		-200		200	nA
栅极电荷 Gate Charge	Q_G	V_{CE}=600V, I_C=450A , V_{GE}=±15V			3.05		μC
内部栅极电阻 Internal gate resistor	R_{gint}	T_{vj}=25℃			1.4		Ω
输入电容 Input Capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f =100kHz			65.5		nF
输出电容 Output Capacitance	C_{oes}				2.22		
反向传输电容 Reverse Transfer Capacitance	C_{res}				0.13		
开通延迟时间（电感负载） Turn-on delay time,inductive load	$t_{d(on)}$	V_{CC}=600V,I_C=450A R_G=1.8Ω, V_{GE}=15V	T_{vj}=25℃		160		ns
			T_{vj}=125℃		184		ns
			T_{vj}=150℃		192		ns
上升时间（电感负载） Rise Time,inductive load	t_r		T_{vj}=25℃		68		ns
			T_{vj}=125℃		76		ns
			T_{vj}=150℃		80		ns
关断延迟时间（电感负载） Turn-off delay time,inductive load	$t_{d(off)}$	V_{CC}=600V,I_C=450A R_G=1.8Ω, V_{GE}=15V	T_{vj}=25℃		208		ns
			T_{vj}=125℃		448		ns
			T_{vj}=150℃		464		ns
下降时间（电感负载） Fall time,inductive load	t_f		T_{vj}=25℃		240		ns
			T_{vj}=125℃		380		ns
			T_{vj}=150℃		424		ns
开通损耗能量（每脉冲） Turn-on energy loss per pulse	E_{on}	V_{CC}=600V,I_C=450A R_G=1.8Ω, V_{GE}=15V	T_{vj}=25℃		24.6		mJ
			T_{vj}=125℃		38.1		mJ
			T_{vj}=150℃		45.3		mJ
关断损耗能量（每脉冲） Turn off Energy loss per pulse	E_{off}		T_{vj}=25℃		48.0		mJ
			T_{vj}=125℃		64.8		mJ
			T_{vj}=150℃		70.2		mJ
短路数据 SC data	I_{SC}	V_{GE}≤15V, V_{CC}=800V	tp≤10μs T_{vj}=150℃			1800	A
IGBT结-外壳热阻 IGBT thermal resistance,junction-case	R_{thJC}					0.09	K /W
工作温度 Operating Temperature	T_{Jop}			-40		150	℃

Diode / 二极管

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions		Values	Unit
反向重复峰值电压 Repetitive reverse voltage	V_{RRM}		T_{vj}=25℃	1200	V
连续正向直流电流 Continuous DC forward current	I_F			450	A
二极管正向不重复峰值电流 Diode pulsed current,tp limited by T_{Jmax}	I_{Fpulse}			900	

Characteristic Values / 特征值

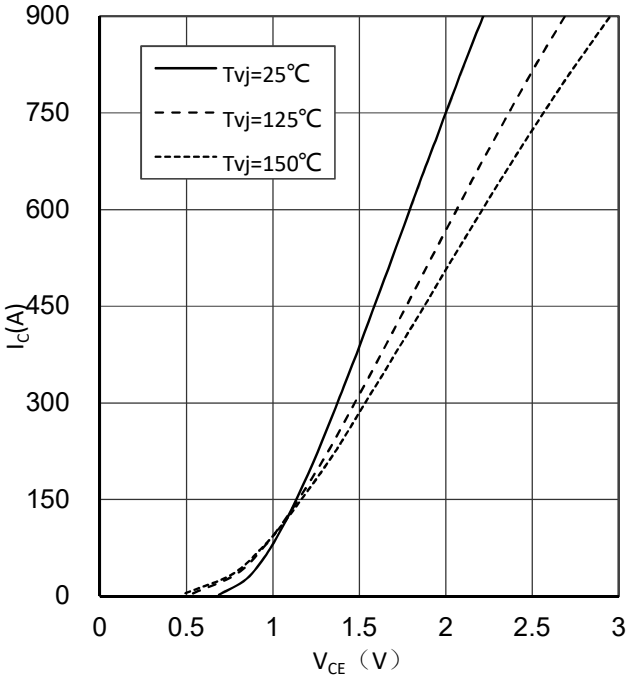
Item	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
正向电压 Forward voltage	V_F	I_F=450A , V_{GE}=0V	T_{vj}=25℃	1.50	2.05	2.40	V
			T_{vj}=125℃		2.07		
			T_{vj}=150℃		2.02		
反向恢复时间 Reverse recovery time	t_{rr}	I_F=450A dI_F/dt=-4950A/μs (T_{vj}=150°C) V_R=600V, V_{GE}=-15V	T_{vj}=25℃		148		ns
			T_{vj}=125℃		330		
			T_{vj}=150℃		415		
反向恢复峰值电流 Peak reverse recovery current	I_{RRM}		T_{vj}=25℃		310		A
			T_{vj}=125℃		365		
			T_{vj}=150℃		385		
反向恢复电荷 Reverse recovery charge	Q_{RR}		T_{vj}=25℃		43.0		μC
			T_{vj}=125℃		74.0		
			T_{vj}=150℃		86.0		
反向恢复损耗（每脉冲） Reverse recovery energy loss per pulse	E_{rec}		T_{vj}=25℃		15.7		mJ
			T_{vj}=125℃		29.4		
			T_{vj}=150℃		35.9		
二极管结-外壳热阻 Diode thermal resistance,junction-case	R_{thJCD}					0.13	K /W
工作温度 Operating Temperature	T_{Jop}			-40		150	℃

NTC-Thermistor / 负温度系数热敏电阻

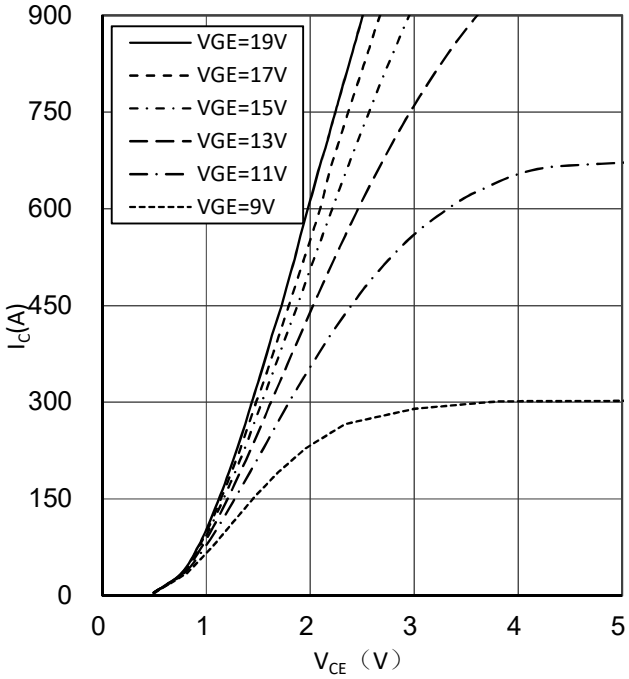
Characteristic Values /特征值

Item	Symbol	Conditions		Values	Unit
额定电阻值 Rated resistance	R_{25}		T_C=25℃	5.00	kΩ
B-值 B-value	$R_{25/50}$			3375	K

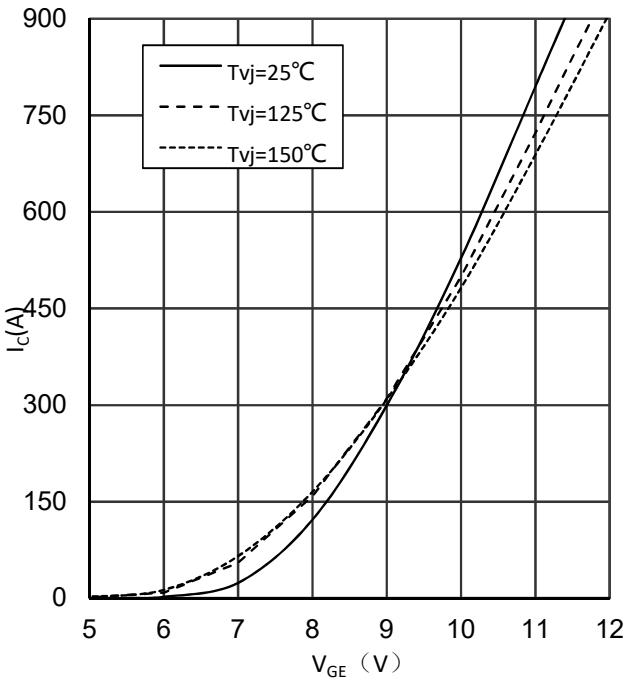
输出特性（典型）
Output characteristic(typical)
$I_C = f(V_{CE})$



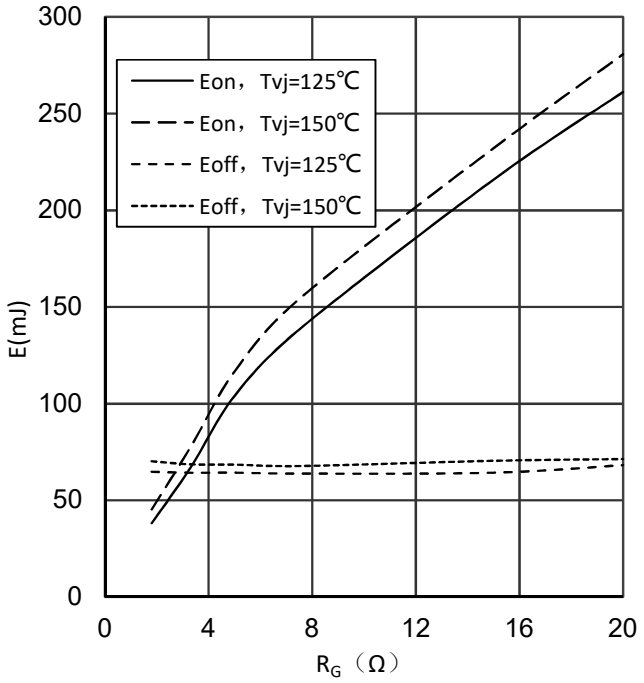
输出特性（典型）
Output characteristic(typical)
$I_C = f(V_{CE})$
T_{vj}= 150°C



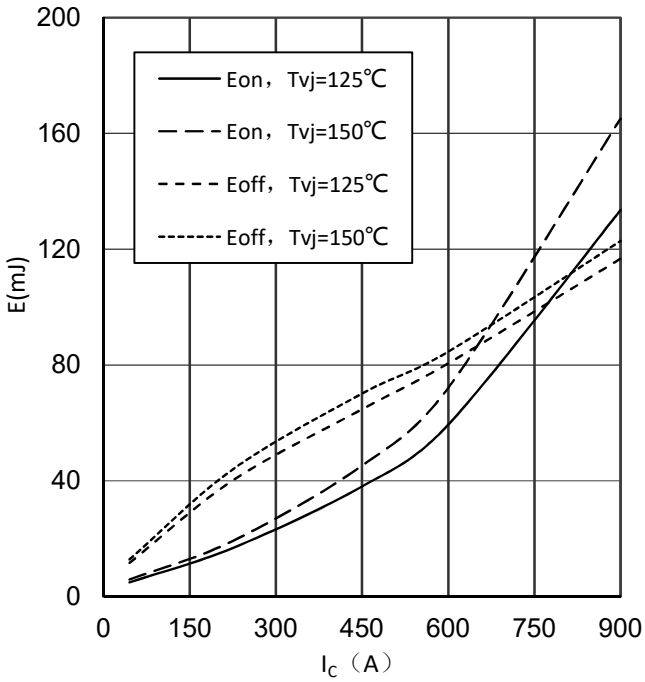
传输特性（典型）
Transfer characteristic(typical)
$I_C = f(V_{GE})$
V_{CE} = 20V



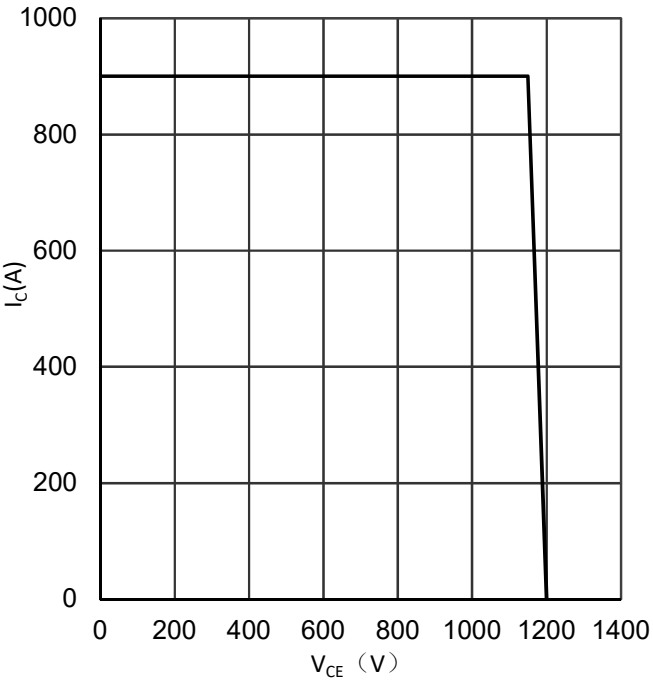
IGBT开关损耗（典型）
Switching losses IGBT (typical)
$E = f(R_G)$
V_{GE} = ±15V, I_C = 450A, V_{CE} = 600V



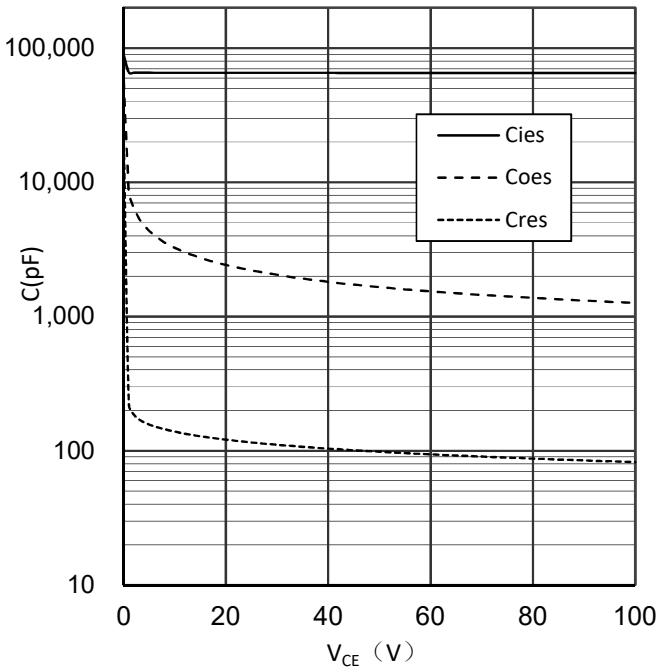
IGBT开关损耗（典型）
Switching losses IGBT (typical)
E = f (I_C)
V_{GE} = ±15V, R_G = 1.8Ω , V_{CE} = 600V



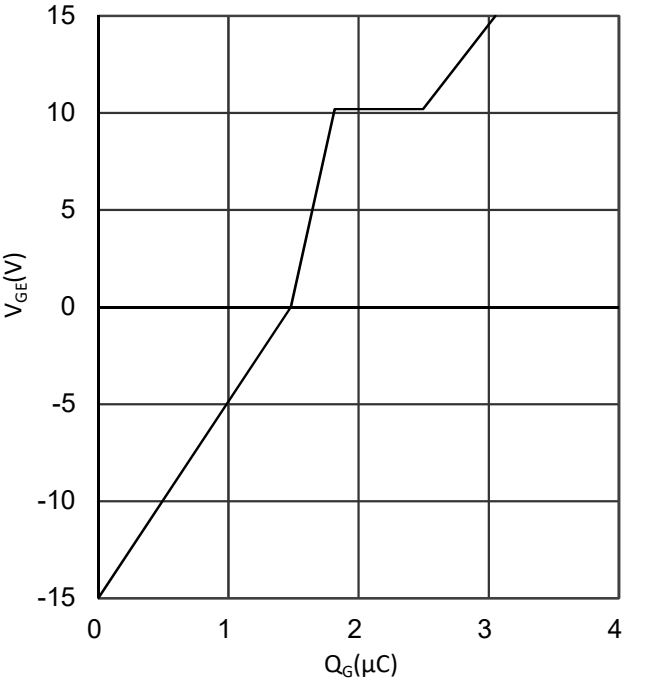
反偏安全工作区（RBSOA）
Reverse bias safe operating area(RBSOA)
I_C =f (V_{CE})
V_{GE} = ±15V, R_{goff} = 3.3Ω, T_{vj} = 150°C



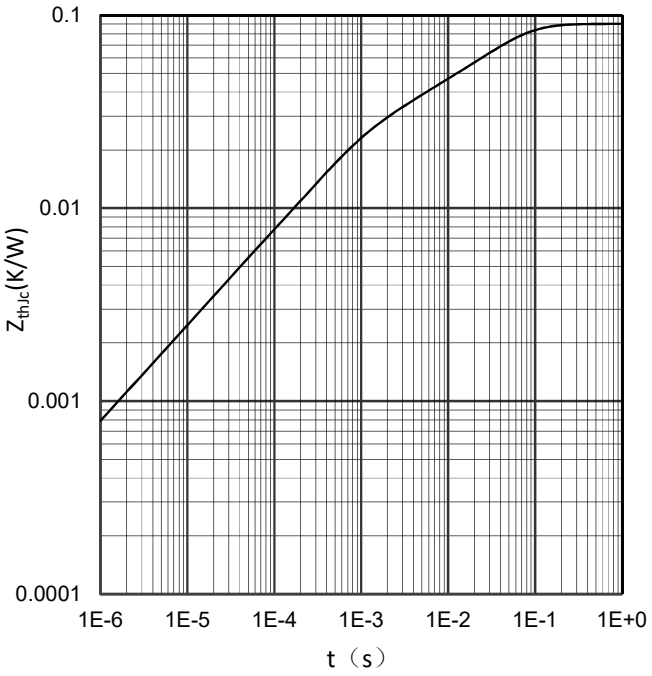
电容（典型）
Typical capacitance as a function of collector-emitter voltage
C = f (V_{CE})
f = 100 kHz, V_{GE} = 0V



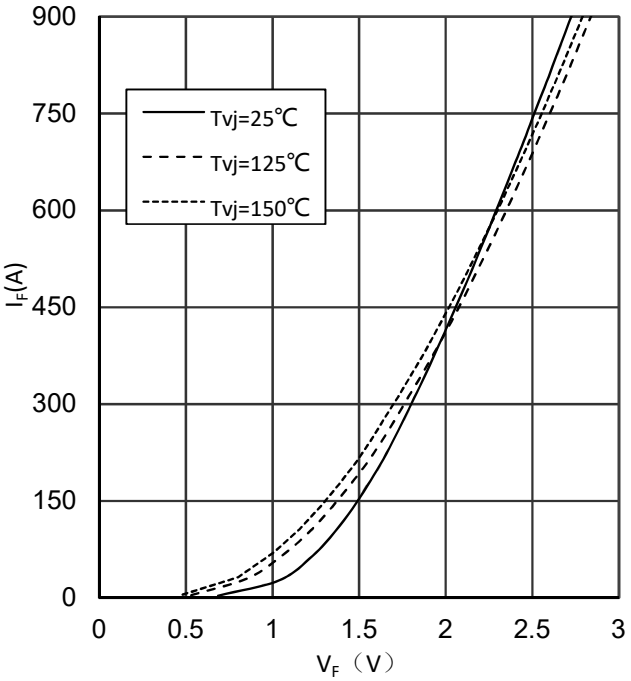
门极电荷（典型）
Gate charge (typical)
V_{GE} = f (Q_G)
I_C = 450A, V_{CE} = 600V



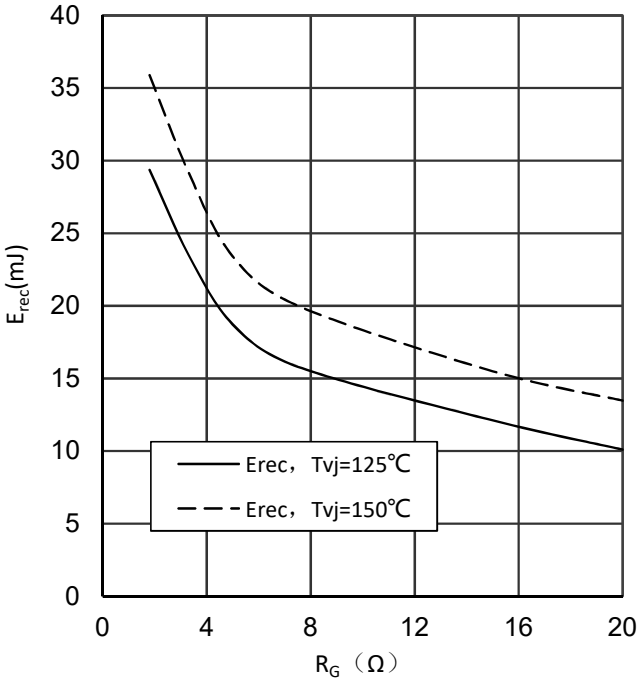
IGBT瞬态热阻抗
IGBT transient thermal impedance as a function of pulse width
$Z_{th(j-c)} = f(t)$



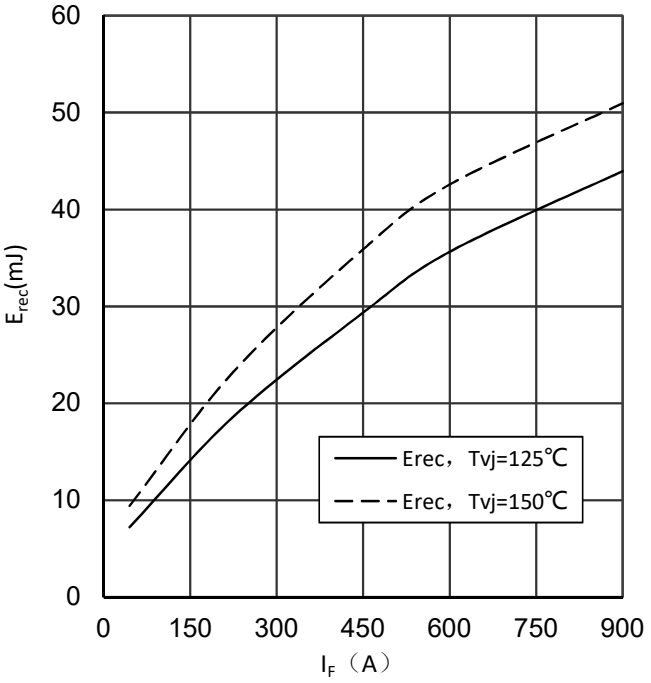
正向偏压特性 二极管（典型）
Forward characteristic of Diode (typical)
$I_F = f(V_F)$



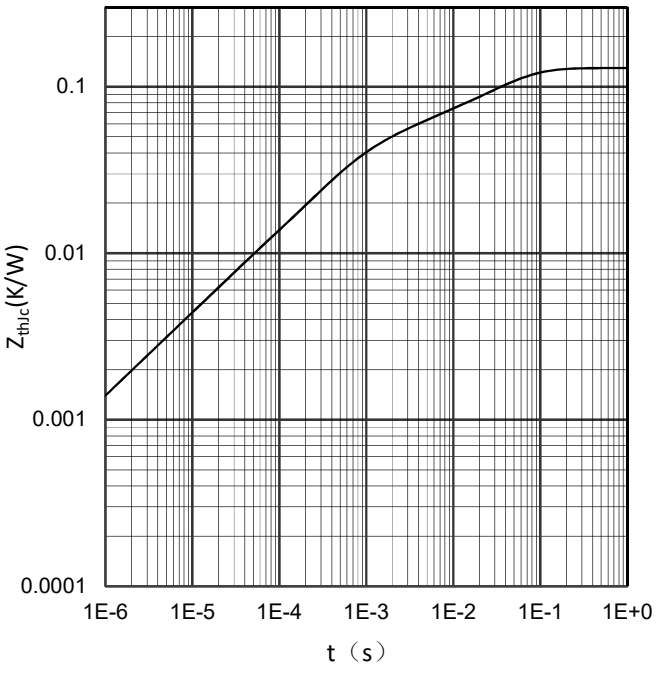
开关损耗 二极管（典型）
Switching losses Diode(typical)
$E_{rec} = f(R_G)$
I_F = 450A, V_{CE} = 600V



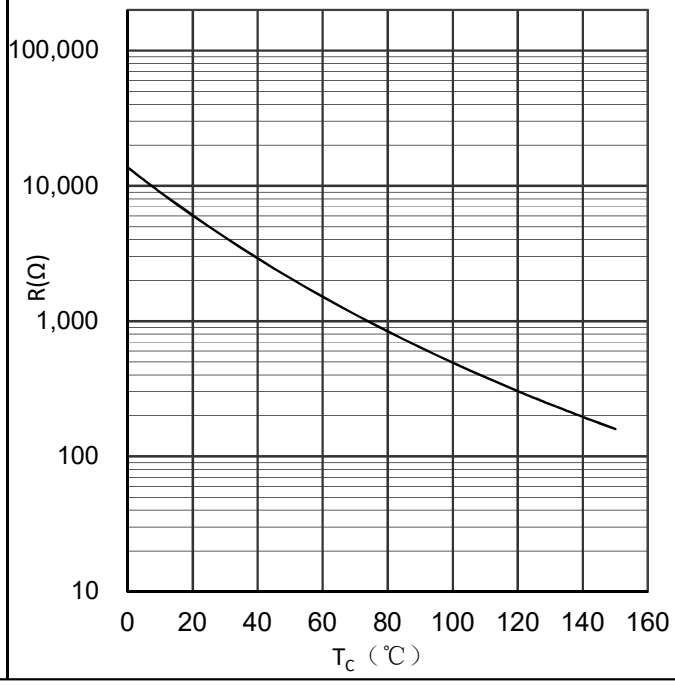
开关损耗 二极管（典型）
Switching losses Diode(typical)
$E_{rec} = f(I_F)$
R_G = 1.8Ω, V_{CE} = 600V



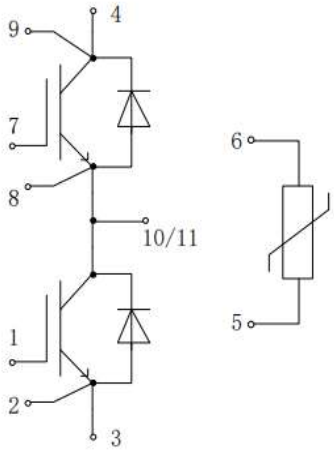
二极管瞬态热阻抗
Diode transient thermal impedance as a function of pulse width
$Z_{th(j-c)} = f(t)$



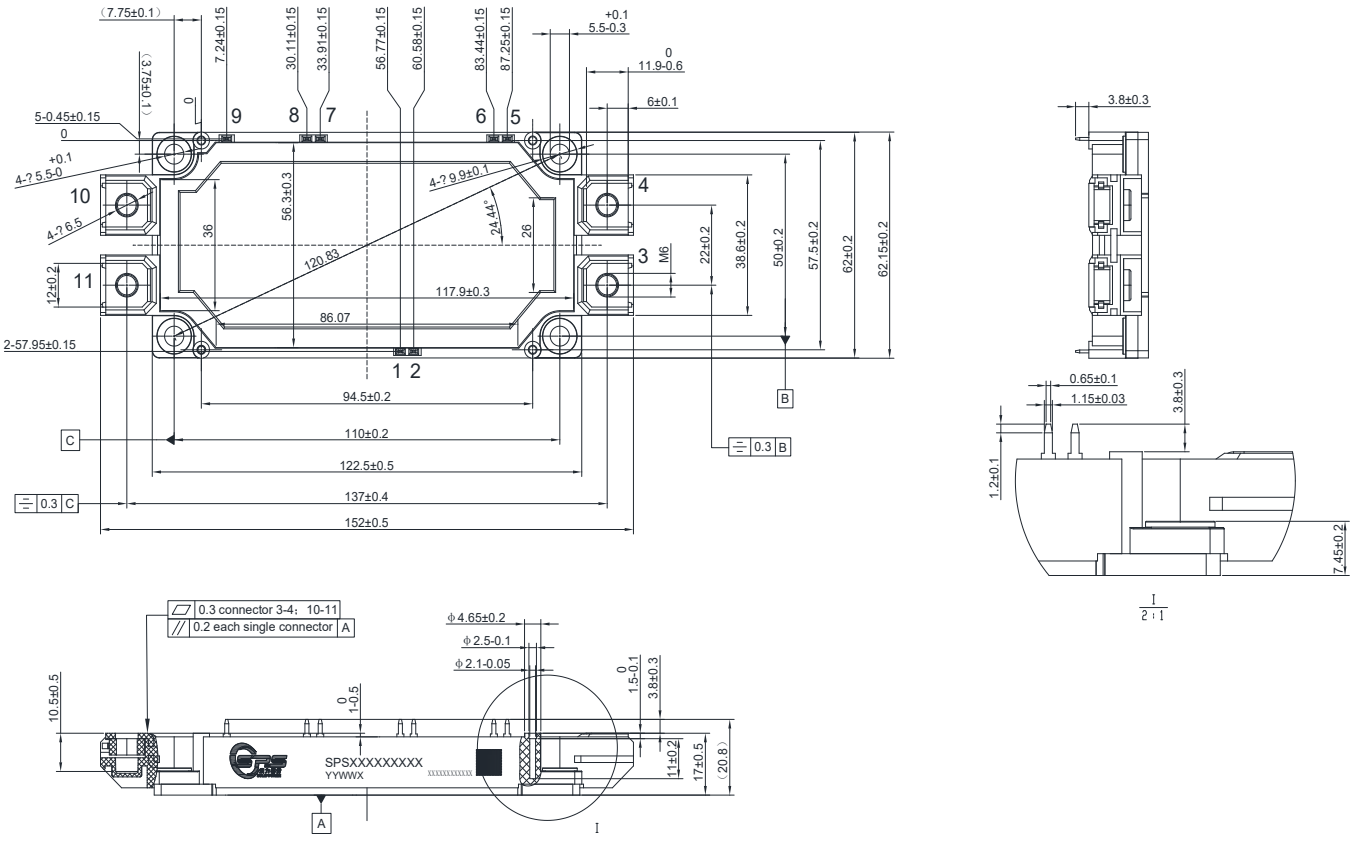
热敏电阻温度特性（典型）
NTC-Thermistor-temperature characteristic (typical)
R = f (T)



Circuit diagram headline / 接线图



Package outlines / 封装尺寸



Dimensions in (mm)

单位：mm