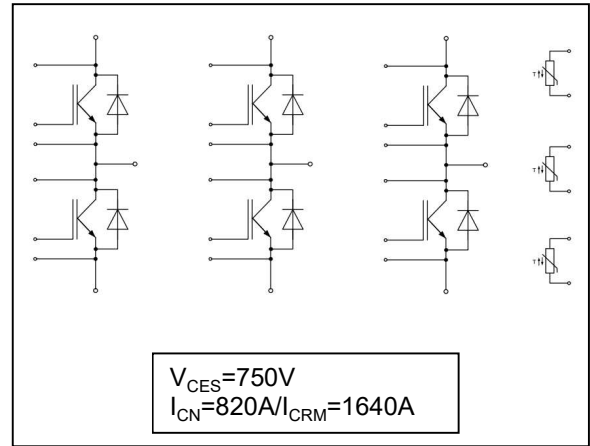
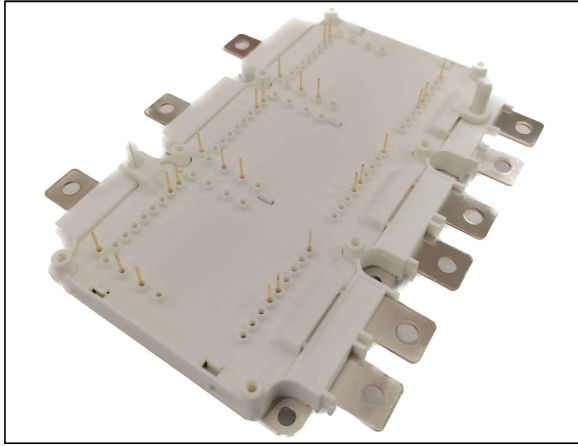


## 750V 820A IGBT Full Bridge Module

## 750V 820A IGBT 全桥模块



### Features:

- 750V 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

### Typical Applications:

- Motor drives
- Hybrid electrical vehicles
- Automotive applications
- Commercial agriculture vehicles

### 产品特性:

- 750V 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

### 典型应用:

- 电机驱动器
- 混合动力汽车
- 汽车应用
- 商用农用车

**Package / 封装**

Item	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
绝缘测试电压 Isolation test voltage	$V_{ISOL}$	RMS, $f = 0 \text{ Hz}$ , $t = 1 \text{ s}$		4.2		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		9.0		mm
	$d_{Creep}$	端子-端子/terminal to terminal		9.0		
电气间隙 Clearance	$d_{Clear}$	端子-散热片/terminal to heatsink		4.5		mm
	$d_{Clear}$	端子-端子/terminal to terminal		4.5		
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	$L_{SCE}$			10		nH	
模块引线电阻, 端子-芯片 Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_C = 25^\circ\text{C}$		0.75		$m\Omega$	
储存温度 Storage temperature	$T_{stg}$		-40		125	$^\circ\text{C}$	
模块安装的安装扭矩 Mounting torque for module mounting	M4	底板-散热器/baseplate to heatsink		1.8		2.2	Nm
	M3	PCB-框架/PCB to frame		0.45		0.55	Nm
重量 Weight	G			725		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	$V_{CES}$	$T_{vj}=25^{\circ}\text{C}$	750	V
栅极-发射极电压 Maximum gate-emitter voltage	$V_{GES}$		$\pm 20$	V
瞬态栅极-发射极电压 Transient gate-emitter voltage	$V_{GES}$	$t_p \leq 10\mu\text{s}, D=0.01$	$\pm 30$	V
额定电流 Implemented collector current	$I_{CN}$		820	A
连续集电极直流电流 Continuous DC collector current	$I_C$	$T_F = 80^{\circ}\text{C}, T_{vjmax} = 175^{\circ}\text{C}$	450	A
最大脉冲集电极电流 Pulsed collector current, $t_p$ limited by $T_{jmax}$	$I_{Cpulse}$		1640	A
功率损耗 Power dissipation	$P_{tot}$	$T_F=75^{\circ}\text{C}$	769	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	$V_{CE(sat)}$	$I_C=450A, V_{GE}=15V$	$T_{vj}=25^{\circ}C$		1.20	1.40	V
			$T_{vj}=125^{\circ}C$		1.24		
			$T_{vj}=150^{\circ}C$		1.27		
		$I_C=820A, V_{GE}=15V$	$T_{vj}=25^{\circ}C$		1.40	1.60	
			$T_{vj}=125^{\circ}C$		1.55		
			$T_{vj}=150^{\circ}C$		1.60		
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=9.6mA$		5.1	5.8	6.5	V
集电极-发射极截止电流 Collector-emitter cut-off current	$I_{CES}$	$V_{CE}=750V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$			100	$\mu A$
			$T_{vj}=150^{\circ}C$			5	mA
栅极-发射极漏电流 Gate-emitter leakage current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 20V, T_{vj}=25^{\circ}C$		-200		200	nA
栅极电荷 Gate Charge	$Q_G$	$V_{CE}=400V, I_C=450A, V_{GE}=-8/+15V$			1.6		$\mu C$
栅极内阻 Internal gate resistor	$R_{Gint}$				0.8		$\Omega$
输入电容 Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=100kHz$			42.4		nF
输出电容 Output Capacitance	$C_{oes}$				3.1		
反向传输电容 Reverse Transfer Capacitance	$C_{res}$				0.8		
开通延迟时间 (电感负载) Turn-on delay time, inductive load	$t_{d(on)}$	$V_{CC}=400V, I_C=450A, R_{Gon}=2.5\Omega, V_{GE}=-8/+15V$	$T_{vj}=25^{\circ}C$		90		ns
			$T_{vj}=125^{\circ}C$		92		ns
			$T_{vj}=150^{\circ}C$		96		ns
上升时间 (电感负载) Rise Time, inductive load	$t_r$		$T_{vj}=25^{\circ}C$		64		ns
			$T_{vj}=125^{\circ}C$		68		ns
			$T_{vj}=150^{\circ}C$		70		ns
关断延迟时间 (电感负载) Turn-off delay time, inductive load	$t_{d(off)}$	$V_{CC}=400V, I_C=450A, R_{Goff}=5.1\Omega, V_{GE}=-8/+15V$	$T_{vj}=25^{\circ}C$		520		ns
			$T_{vj}=125^{\circ}C$		580		ns
			$T_{vj}=150^{\circ}C$		590		ns
下降时间 (电感负载) Fall time, inductive load	$t_f$		$T_{vj}=25^{\circ}C$		200		ns
			$T_{vj}=125^{\circ}C$		310		ns
			$T_{vj}=150^{\circ}C$		320		ns
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	$E_{on}$	$V_{CC}=400V, I_C=450A, R_G=2.5\Omega, R_{Goff}=5.1\Omega, V_{GE}=-8/+15V$	$T_{vj}=25^{\circ}C$		15.0		mJ
			$T_{vj}=125^{\circ}C$		18.0		mJ
			$T_{vj}=150^{\circ}C$		20.0		mJ
关断损耗能量 (每脉冲) Turn off Energy loss per pulse	$E_{off}$		$T_{vj}=25^{\circ}C$		33.5		mJ
			$T_{vj}=125^{\circ}C$		41.0		mJ
			$T_{vj}=150^{\circ}C$		43.0		mJ

### Characteristic Values / 特征值

Item	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
短路数据 SC data	$I_{SC}$	$V_{GE} \leq 15V,$ $V_{CC} = 400V$			5400	A
IGBT结-冷却液热阻 IGBT thermal resistance, junction-cooling fluid	$R_{thJF}$				0.13	K/W
工作温度 Operating Temperature	$T_{Jop}$		-40		175	°C

### 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	$V_{RRM}$	$T_{vj} = 25^{\circ}C$	750	V
额定正向电流 Implemented forward current	$I_{CN}$		820	A
连续正向直流电流 Continuous DC forward current	$I_F$	$T_F = 80^{\circ}C, T_{vjmax} = 175^{\circ}C$	450	A
二极管正向不重复峰值电流 Diode pulsed current, tp limited by $T_{Jmax}$	$I_{Fpulse}$		1640	

Characteristic Values / 特征值

Item	Symbol	Conditions	Values			Unit	
			Min.	Typ.	Max.		
正向电压 Forward voltage	$V_F$	$I_F=450A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$		1.20	1.60	V
			$T_{vj}=125^{\circ}C$		1.16		
			$T_{vj}=150^{\circ}C$		1.14		
		$I_F=820A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$		1.42	1.80	
			$T_{vj}=125^{\circ}C$		1.43		
			$T_{vj}=150^{\circ}C$		1.44		
反向恢复时间 Reverse recovery time	$t_{rr}$	$I_F=450A$ $dI_F/dt=-6700A/\mu s$ ( $T_{vj}=150^{\circ}C$ ) $V_R=400V,$ $V_{GE}=-8V$	$T_{vj}=25^{\circ}C$		122	ns	
			$T_{vj}=125^{\circ}C$		160		
			$T_{vj}=150^{\circ}C$		172		
反向恢复峰值电流 Peak reverse recovery current	$I_{RRM}$	$V_R=400V,$ $V_{GE}=-8V$	$T_{vj}=25^{\circ}C$		295	A	
			$T_{vj}=125^{\circ}C$		360		
			$T_{vj}=150^{\circ}C$		375		
反向恢复电荷 Reverse recovery charge	$Q_{RR}$		$T_{vj}=25^{\circ}C$		28.5	$\mu C$	
			$T_{vj}=125^{\circ}C$		40.5		
			$T_{vj}=150^{\circ}C$		43.5		
反向恢复损耗（每脉冲） Reverse recovery energy loss per pulse	$E_{rec}$		$T_{vj}=25^{\circ}C$		6.2	mJ	
			$T_{vj}=125^{\circ}C$		11.7		
			$T_{vj}=150^{\circ}C$		13.2		
二极管结-冷却液热阻 Diode thermal resistance,junction-cooling fluid	$R_{thJFD}$				0.25	K /W	
工作温度 Operating Temperature	$T_{Jop}$			-40	175	$^{\circ}C$	

NTC-Thermistor / 负温度系数热敏电阻

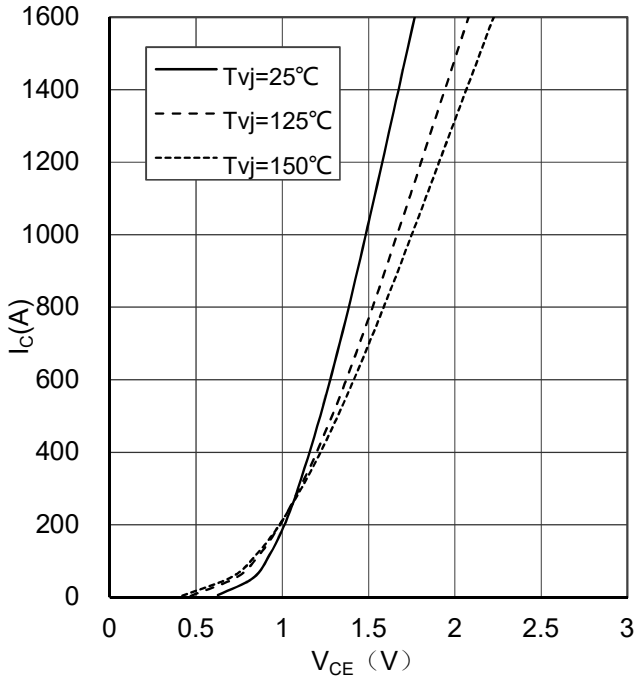
Characteristic Values / 特征值

Item	Symbol	Conditions	Values	Unit
额定电阻值 Rated resistance	$R_{25}$	$T_C=25^{\circ}C$	5.00	k $\Omega$
B-值 B-value	$R_{25/50}$		3375	K

输出特性 (典型)

Output characteristic (typical)

$I_C = f(V_{CE})$

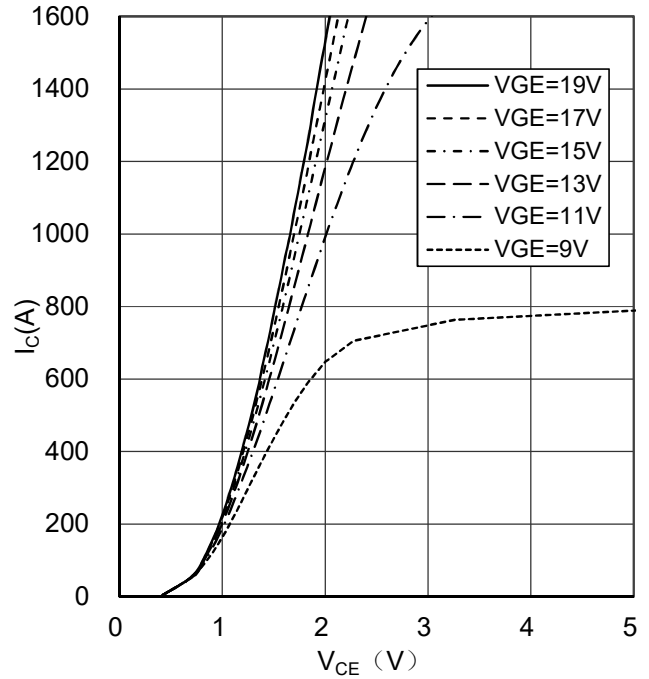


输出特性 (典型)

Output characteristic (typical)

$I_C = f(V_{CE})$

$T_{vj} = 150^\circ\text{C}$

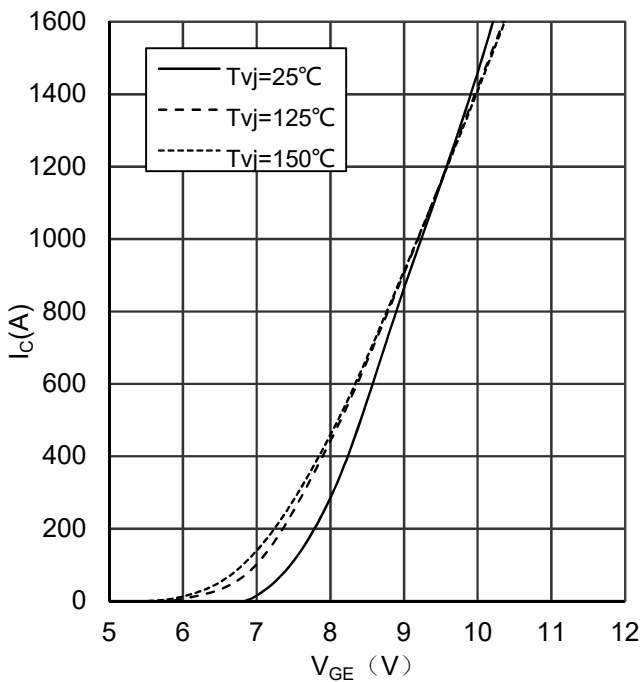


传输特性 (典型)

Transfer characteristic (typical)

$I_C = f(V_{GE})$

$V_{CE} = 20\text{V}$

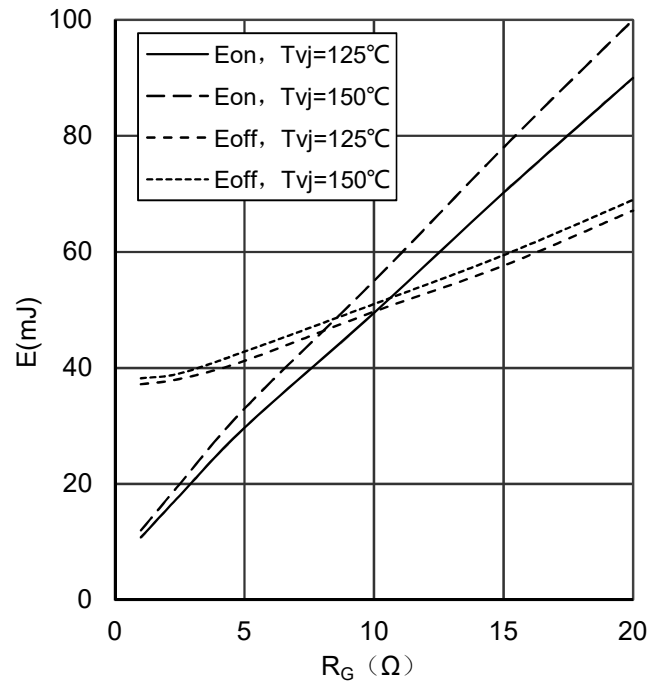


IGBT开关损耗 (典型)

Switching losses IGBT (typical)

$E = f(R_G)$

$V_{GE} = -8/+15\text{V}, I_C = 450\text{A}, V_{CE} = 400\text{V}$

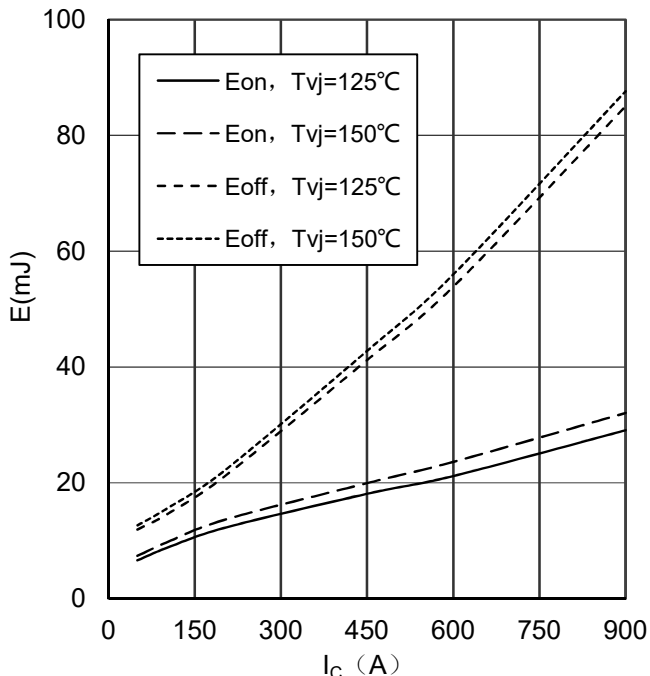


### IGBT开关损耗 (典型)

#### Switching losses IGBT (typical)

$$E = f(I_C)$$

$V_{GE} = -8/+15V, R_{Gon} = 2.5\Omega, R_{Goff} = 5.1\Omega, V_{CE} = 400V$

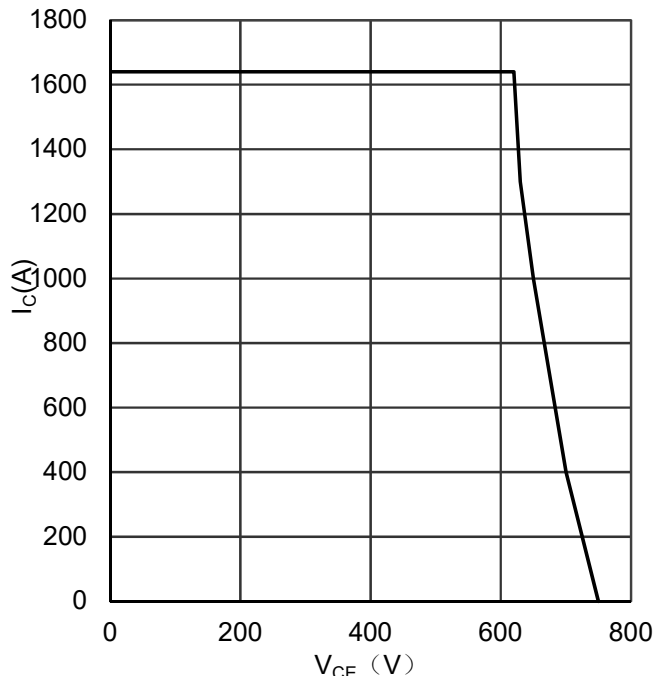


### 反偏安全工作区 (RBSOA)

#### Reverse bias safe operating area(RBSOA)

$$I_C = f(V_{CE})$$

$V_{GE} = -8/+15V, R_{goff} = 5.1\Omega, T_{vj} = 150^\circ C$

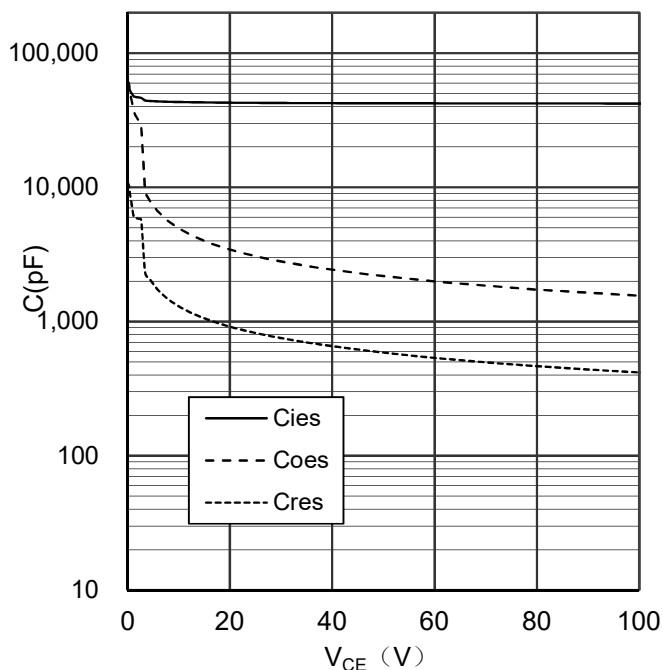


### 电容 (典型)

#### Typical capacitance as a function of collector-emitter voltage

$$C = f(V_{CE})$$

$f = 100\text{ kHz}, V_{GE} = 0V$

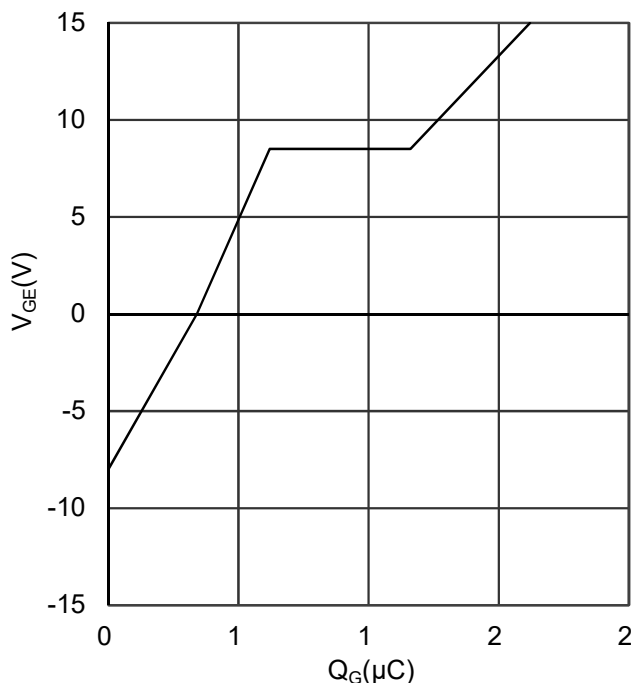


### 门极电荷 (典型)

#### Gate charge (typical)

$$V_{GE} = f(Q_G)$$

$I_C = 450A, V_{CE} = 400V$

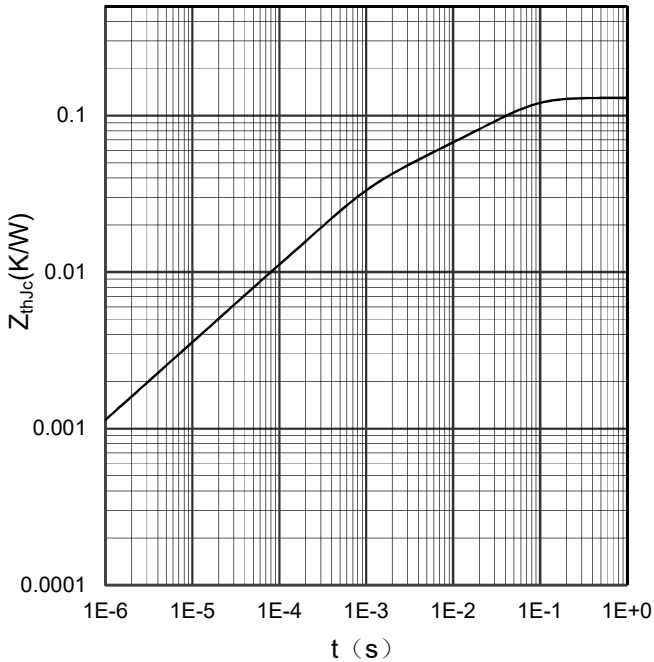




IGBT瞬态热阻抗

IGBT transient thermal impedance

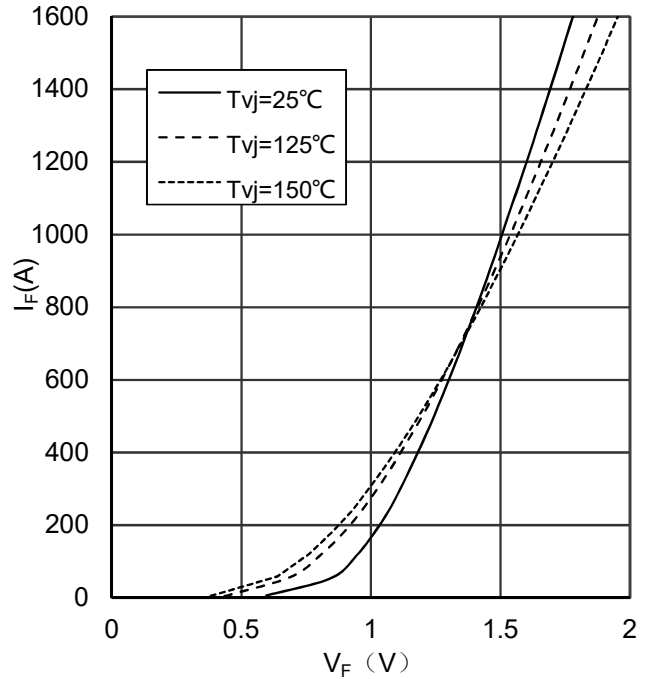
$Z_{th(j-c)} = f(t)$



正向偏压特性 二极管 (典型)

Forward characteristic of Diode (typical)

$I_F = f(V_F)$

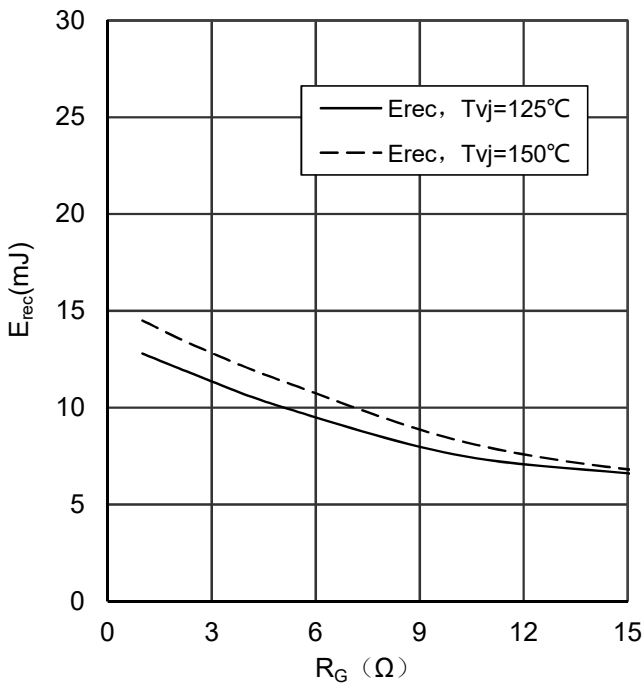


开关损耗 二极管 (典型)

Switching losses Diode (typical)

$E_{rec} = f(R_G)$

$I_F = 450A, V_{CE} = 400V$

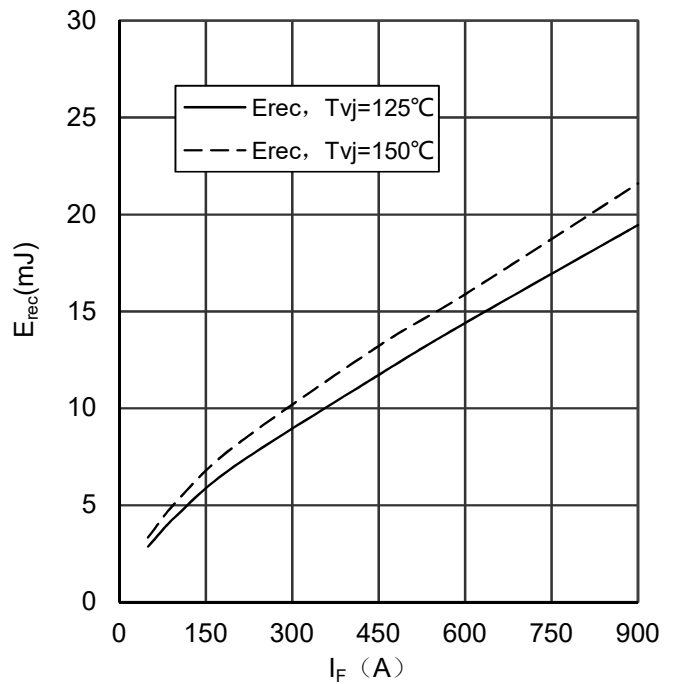


开关损耗 二极管 (典型)

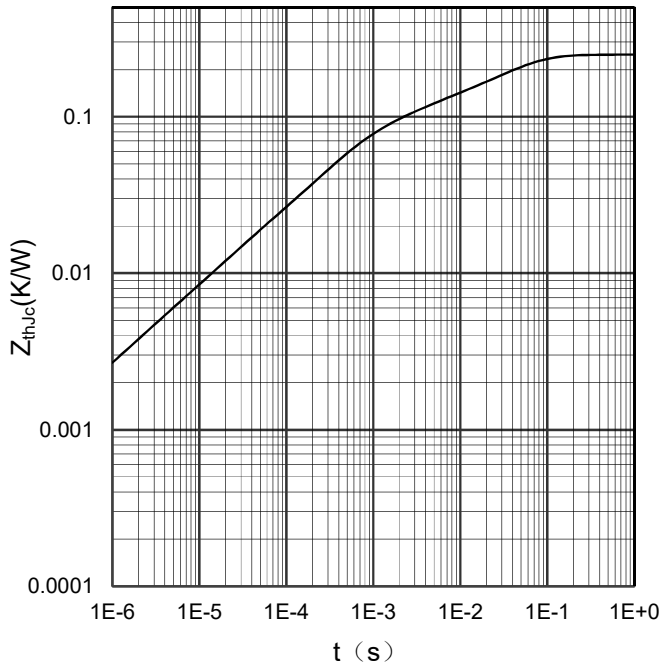
Switching losses Diode (typical)

$E_{rec} = f(I_F)$

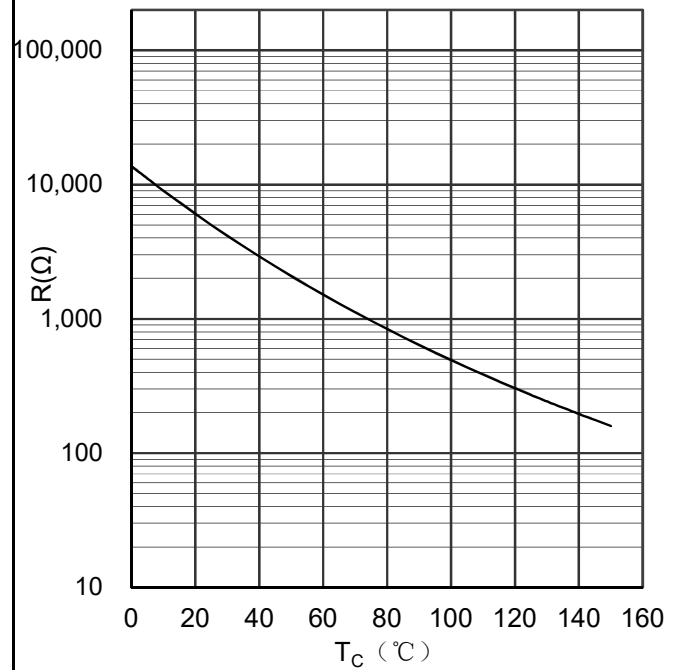
$R_G = 2.5Ω, V_{CE} = 400V$



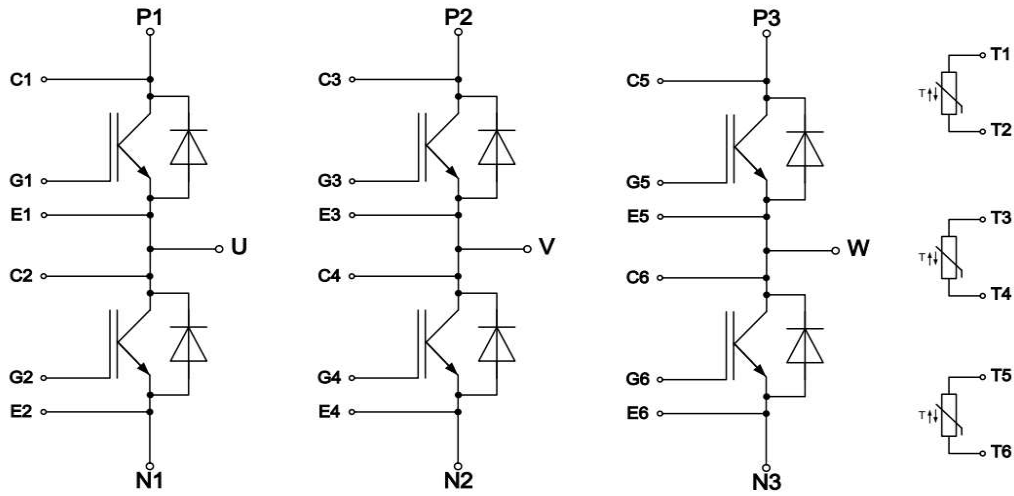
二极管瞬态热阻抗  
Diode transient thermal impedance  
 $Z_{th(j-c)} = f(t)$



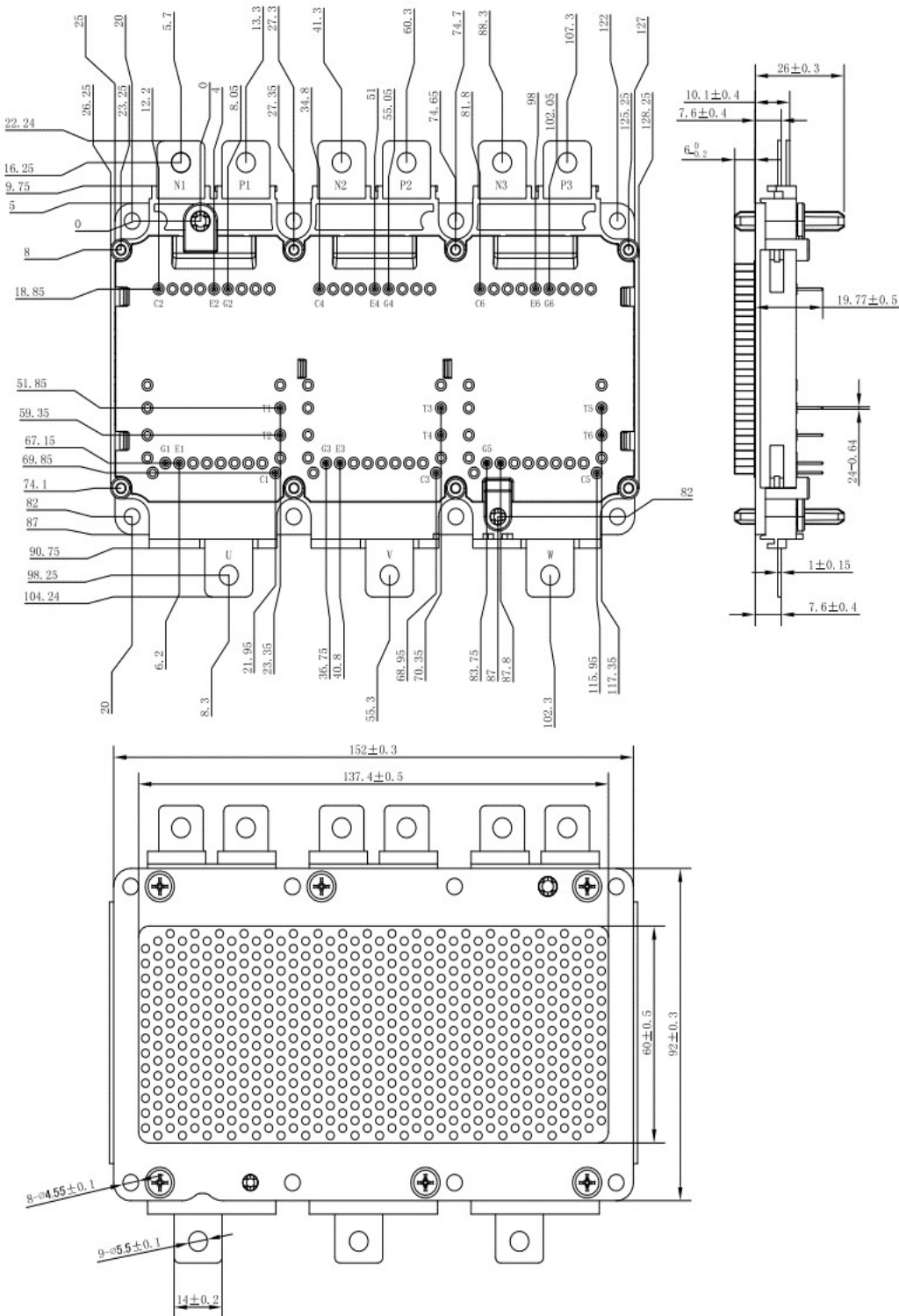
热敏电阻温度特性 (典型)  
NTC-Thermistor-temperature characteristic (typical)  
 $R = f(T)$



### Circuit diagram headline / 接线图



### Package outlines / 封装尺寸



Dimensions in (mm)

单位: mm