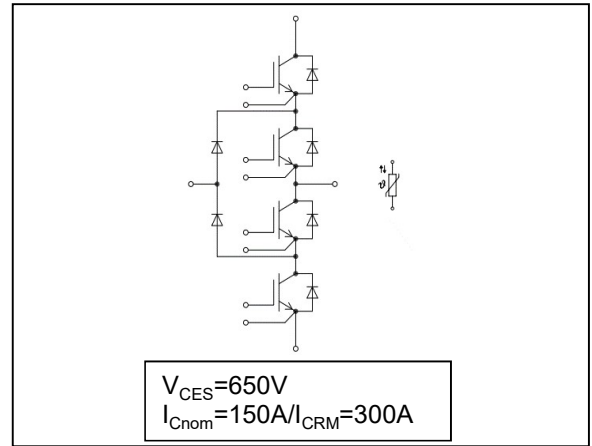
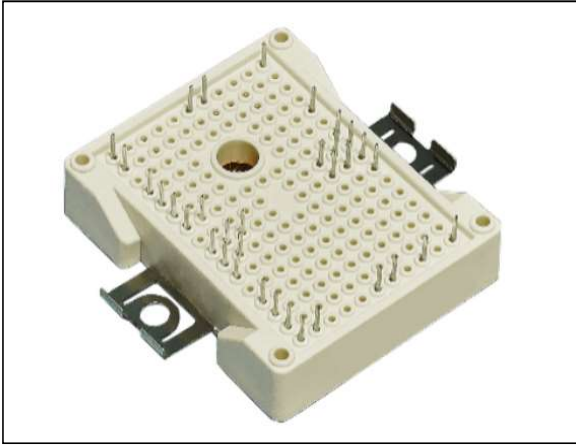


650V 150A Three Level Inverter IGBT Module

650V 150A IGBT 三电平模块



Features:

- Increased blocking voltage capability to 650V
- $V_{CE(sat)}$ with positive temperature coefficient
- Low switching losses
- Low inductive design
- Low $V_{CE(sat)}$

Typical Applications:

- 3-Level-Applications
- Solar Applications
- UPS Systems

产品特性:

- 增加阻断电压至650V
- 导通压降具有正温度系数
- 低开关损耗
- 低电感设计
- 低 $V_{CE(sat)}$

典型应用:

- 三电平应用
- 太阳能应用
- UPS系统

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
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	11.5	mm
	d_{Creep}	端子-端子/terminal to terminal	6.3	
电气间隙 Clearance	d_{Clear}	端子-散热片/terminal to heatsink	10.0	mm
	d_{Clear}	端子-端子/terminal to terminal	5.0	
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	$R_{CC'+EE'}$	$T_C=25^\circ C$		2.80		m Ω
储存温度 Storage temperature	T_{stg}		-40		125	$^\circ C$
每个扣具安装力 Mounting Force Per Clamp	F		40		80	N
重量 Weight	G			41		g

IGBT (T1/T2/T3/T4)

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}	$T_{vj}=25^{\circ}C$	650	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}	$t_p \leq 10\mu s, D=0.01$	± 30	V
连续集电极直流电流 Continuous DC collector current	I_C	$T_C=25^{\circ}C$	150	A
		$T_C=80^{\circ}C$	100	
最大脉冲集电极电流 Pulsed collector current, t_p limited by T_{jmax}	I_{Cpulse}		300	A
功率损耗 Power dissipation	P_{tot}		375	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	$V_{CE(sat)}$	$I_C=150A, V_{GE}=15V$	$T_{vj}=25^{\circ}C$		1.57	1.95	V
			$T_{vj}=125^{\circ}C$		1.82		
			$T_{vj}=150^{\circ}C$		1.76		
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=2.4mA$		4.7	5.3	5.9	V
集电极-发射极截止电流 Collector-emitter cut-off current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$			100	μA
			$T_{vj}=150^{\circ}C$			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	$V_{CE}=300V, I_C=150A, V_{GE}=\pm 15V$			1.54		μC
输入电容 Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=100kHz$			16.5		nF
反向传输电容 Reverse Transfer Capacitance	C_{res}				0.27		
开通延迟时间 (电感负载) Turn-on delay time, inductive load	$t_{d(on)}$	$V_{CC}=300V, I_C=150A$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15V$	$T_{vj}=25^{\circ}C$		12		ns
			$T_{vj}=125^{\circ}C$		12		ns
			$T_{vj}=150^{\circ}C$		14		ns
上升时间 (电感负载) Rise Time, inductive load	t_r	$V_{CC}=300V, I_C=150A$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15V$	$T_{vj}=25^{\circ}C$		28		ns
			$T_{vj}=125^{\circ}C$		29		ns
			$T_{vj}=150^{\circ}C$		31		ns
关断延迟时间 (电感负载) Turn-off delay time, inductive load	$t_{d(off)}$	$V_{CC}=300V, I_C=150A$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15V$	$T_{vj}=25^{\circ}C$		167		ns
			$T_{vj}=125^{\circ}C$		180		ns
			$T_{vj}=150^{\circ}C$		182		ns
下降时间 (电感负载) Fall time, inductive load	t_f	$V_{CC}=300V, I_C=150A$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15V$	$T_{vj}=25^{\circ}C$		54		ns
			$T_{vj}=125^{\circ}C$		59		ns
			$T_{vj}=150^{\circ}C$		63		ns
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	E_{on}	$V_{CC}=300V, I_C=150A$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15V$	$T_{vj}=25^{\circ}C$		0.66		mJ
			$T_{vj}=125^{\circ}C$		0.83		mJ
			$T_{vj}=150^{\circ}C$		0.91		mJ
关断损耗能量 (每脉冲) Turn off Energy loss per pulse	E_{off}	$V_{CC}=300V, I_C=150A$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15V$	$T_{vj}=25^{\circ}C$		1.28		mJ
			$T_{vj}=125^{\circ}C$		1.66		mJ
			$T_{vj}=150^{\circ}C$		1.80		mJ
IGBT结-外壳热阻 IGBT thermal resistance, junction-case	R_{thJC}					0.4	K/W
工作温度 Operating Temperature	T_{Jop}			-40		150	$^{\circ}C$

Diode / 二极管 (D1/D2/D3/D4/D5/D6)

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
反向重复峰值电压 Repetitive reverse voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$		650		V
连续正向直流电流 Continuous DC forward current	I_F	$T_{vj}=25^{\circ}\text{C}$		150		A
		$T_{vj}=100^{\circ}\text{C}$		150		
二极管正向不重复峰值电流 Diode pulsed current, tp limited by T_{Jmax}	I_{Fpulse}			300		A

Characteristic Values / 特征值

Item	Symbol	Conditions	Values			Unit	
			Min.	Typ.	Max.		
正向电压 Forward voltage	V_F	$I_F=150\text{A}, V_{GE}=0\text{V}$	$T_{vj}=25^{\circ}\text{C}$		1.65	2.00	V
			$T_{vj}=125^{\circ}\text{C}$		1.76		
			$T_{vj}=150^{\circ}\text{C}$		1.73		
反向恢复峰值电流 Peak reverse recovery current	I_{RRM}		$T_{vj}=25^{\circ}\text{C}$		83		A
			$T_{vj}=125^{\circ}\text{C}$		102		
			$T_{vj}=150^{\circ}\text{C}$		112		
反向恢复电荷 Reverse recovery charge	Q_{RR}		$T_{vj}=25^{\circ}\text{C}$		3.1		μC
			$T_{vj}=125^{\circ}\text{C}$		5.3		
			$T_{vj}=150^{\circ}\text{C}$		6.2		
反向恢复损耗 (每脉冲) Reverse recovery energy loss per pulse	E_{rec}		$T_{vj}=25^{\circ}\text{C}$		0.69		mJ
			$T_{vj}=125^{\circ}\text{C}$		1.28		
			$T_{vj}=150^{\circ}\text{C}$		1.49		
二极管结-外壳热阻 Diode thermal resistance, junction-case	R_{thjcd}				0.55	K/W	
工作温度 Operating Temperature	T_{Jop}		-40		150	$^{\circ}\text{C}$	

NTC-Thermistor / 负温度系数热敏电阻

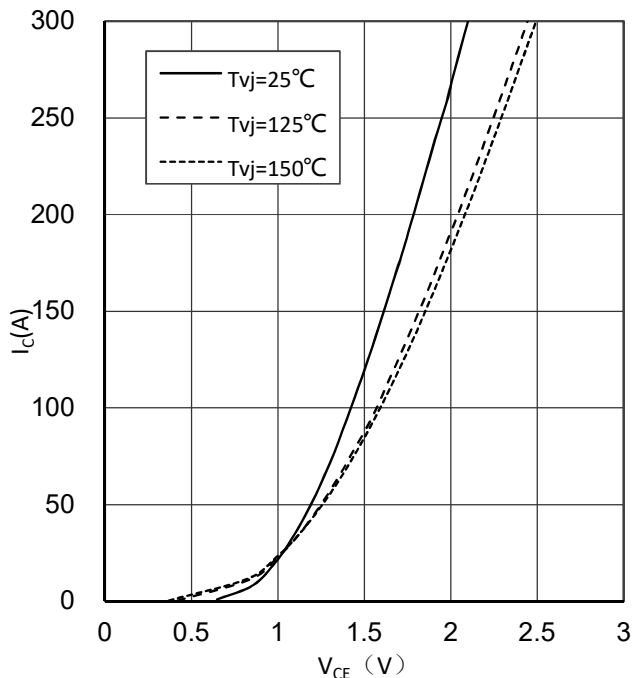
Characteristic Values / 特征值

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

输出特性 (典型)

Output characteristic (typical)

$I_C = f(V_{CE})$

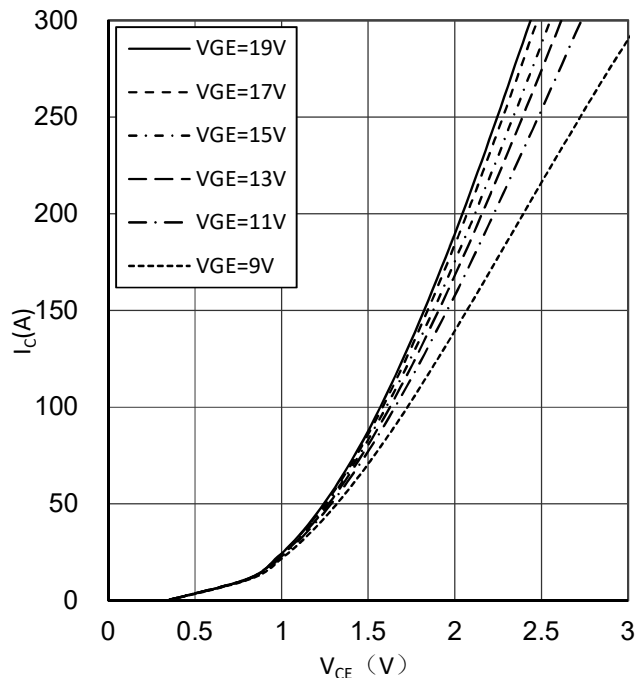


输出特性 (典型)

Output characteristic (typical)

$I_C = f(V_{CE})$

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

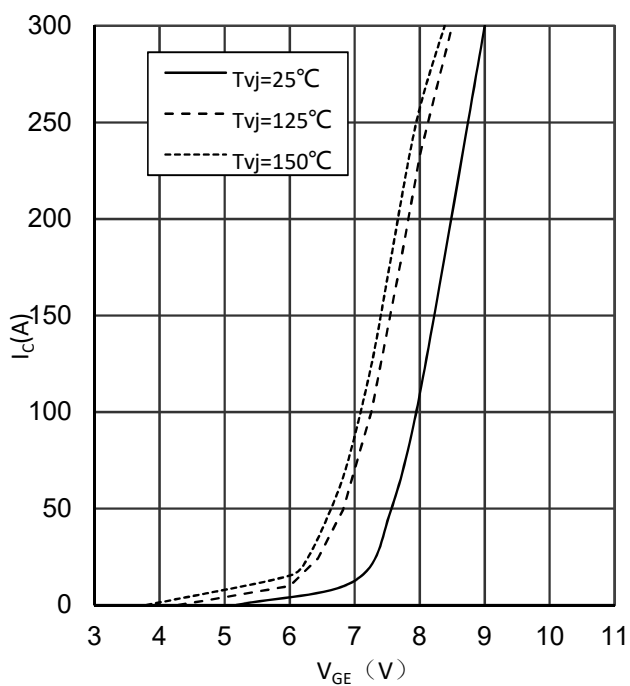


传输特性 (典型)

Transfer characteristic (typical)

$I_C = f(V_{GE})$

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

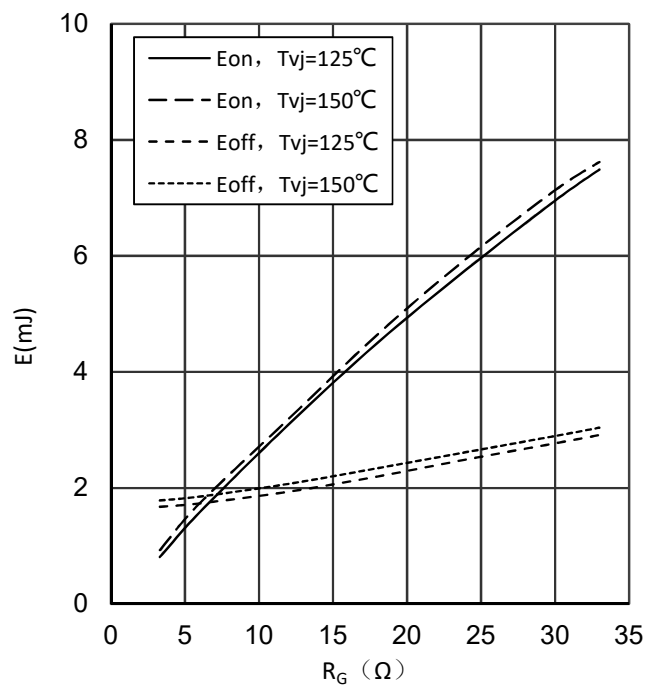


IGBT开关损耗 (典型)

Switching losses IGBT (typical)

$E = f(R_G)$

$V_{GE} = \pm 15\text{V}, I_C = 150\text{A}, V_{CE} = 300\text{V}$

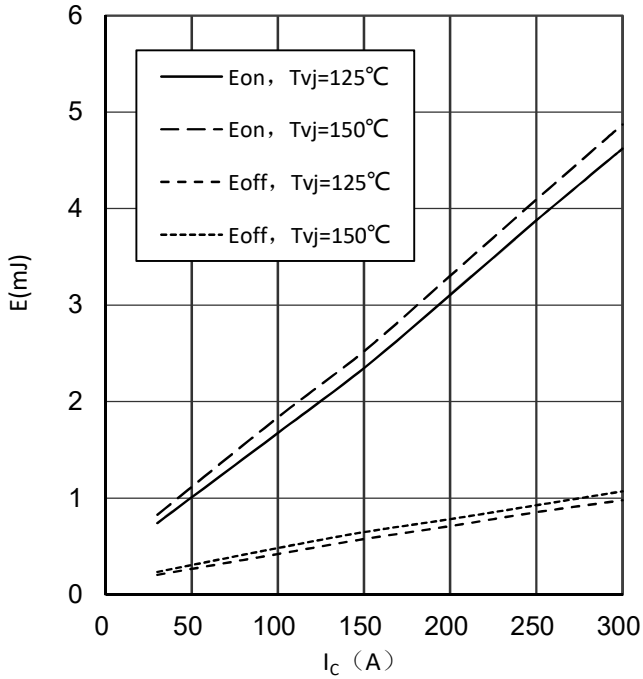


IGBT开关损耗 (典型)

Switching losses IGBT (typical)

$E = f(I_C)$

$V_{GE} = \pm 15V, R_G = 3.3\Omega, V_{CE} = 300V$

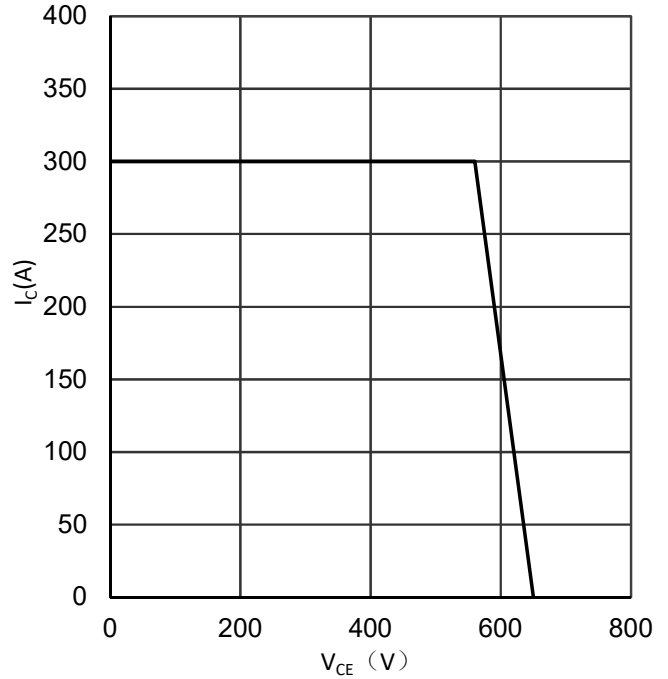


反偏安全工作区 (RBSOA)

Reverse bias safe operating area(RBSOA)

$I_C = f(V_{CE})$

$V_{GE} = \pm 15V, R_{Goff} = 3.3\Omega, T_{vj} = 150^\circ C$

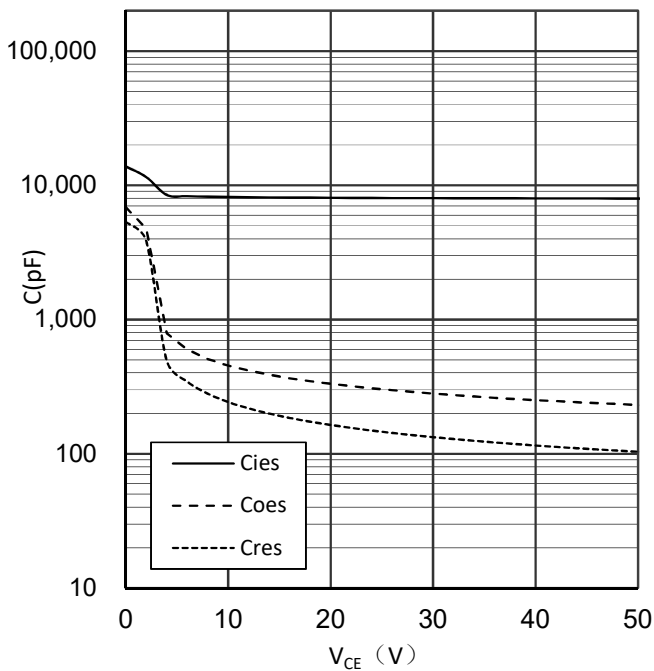


电容 (典型)

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)

$V_{GE} = f(Q_G)$

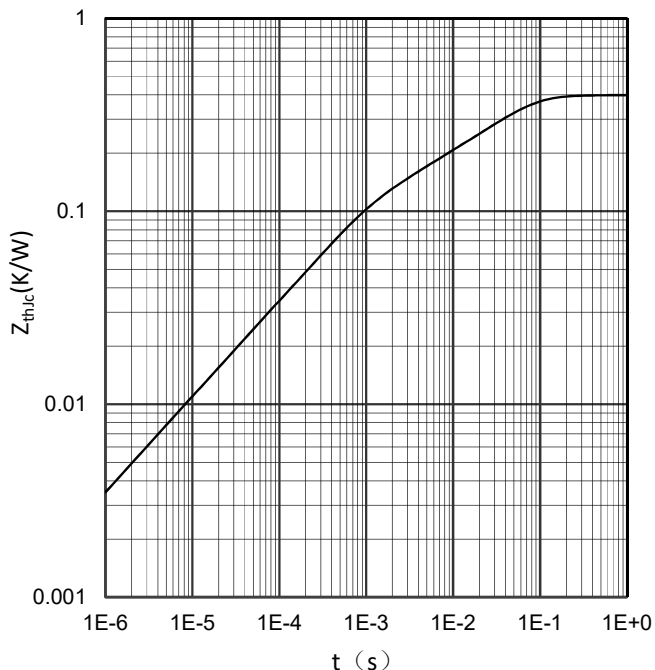
$I_C = 150A, V_{CE} = 300V$

TBD

IGBT瞬态热阻抗

IGBT transient thermal impedance as a function of pulse width

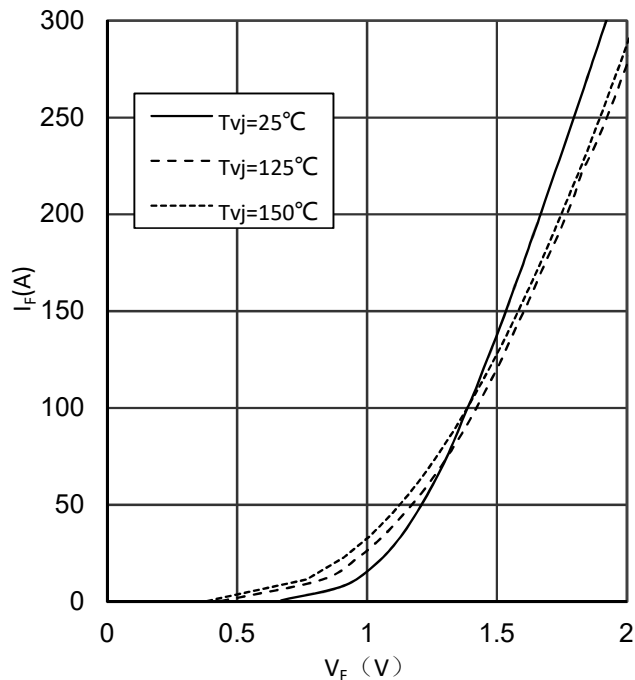
$$Z_{th(j-c)} = f(t)$$



正向偏压特性 二极管 (典型)

Forward characteristic of Diode (typical)

$$I_F = f(V_F)$$

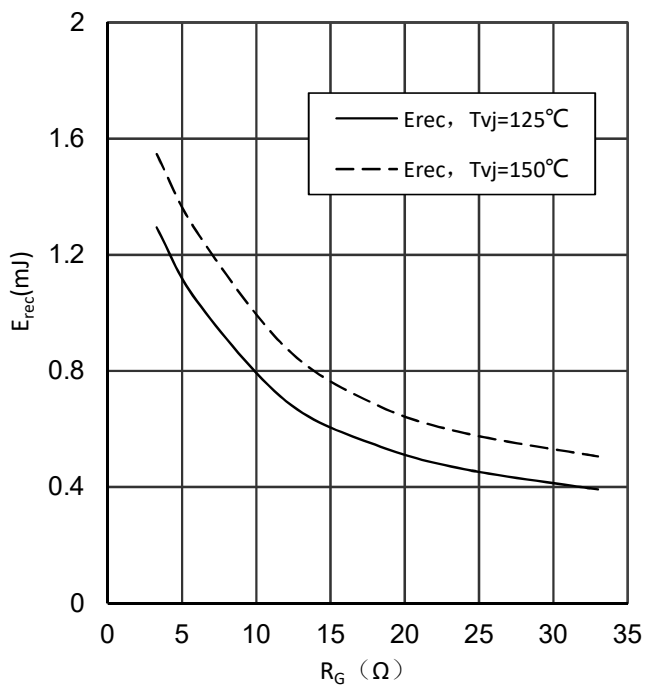


开关损耗 二极管 (典型)

Switching losses Diode (typical)

$$E_{rec} = f(R_G)$$

$I_F = 150A, V_{CE} = 300V$

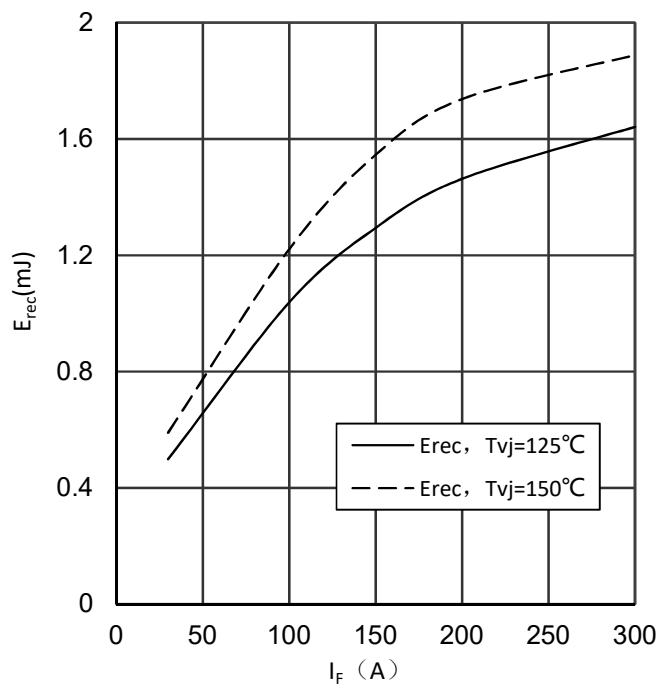


开关损耗 二极管 (典型)

Switching losses Diode (typical)

$$E_{rec} = f(I_F)$$

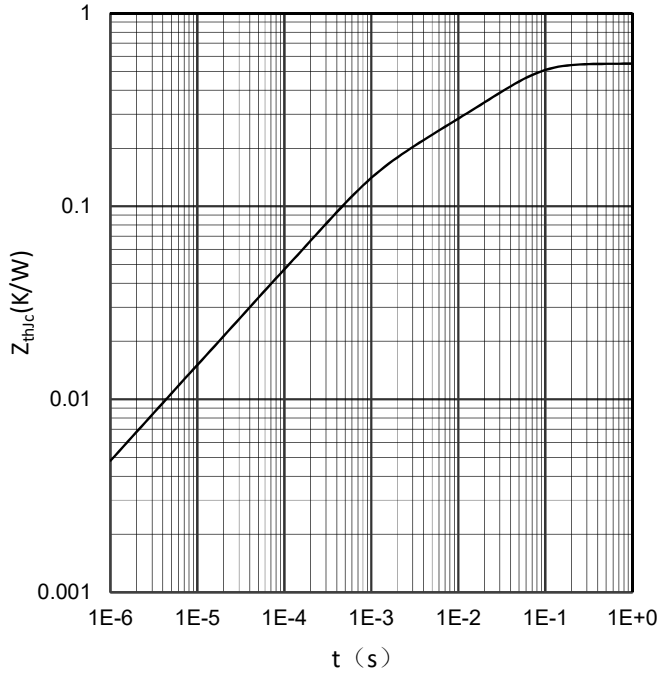
$R_G = 3.3Ω, V_{CE} = 300V$



二极管瞬态热阻抗

Diode transient thermal impedance as a function of pulse width

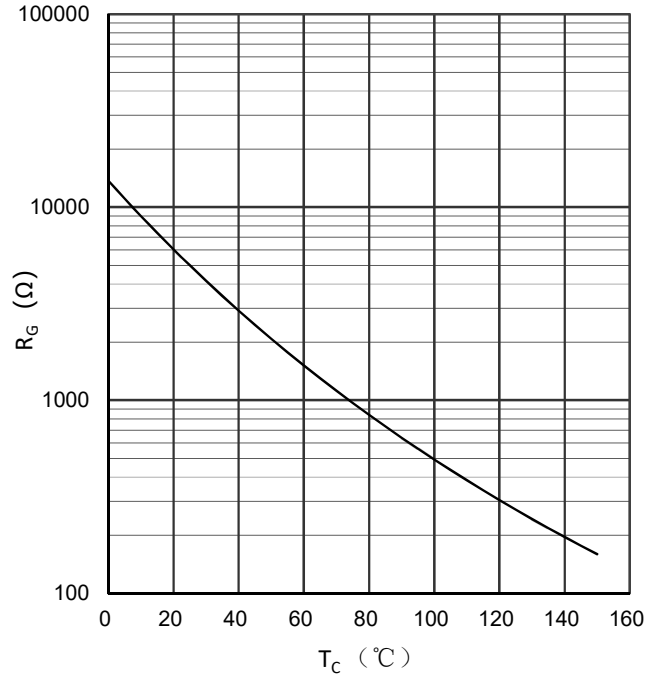
$$Z_{th(j-c)} = f(t)$$



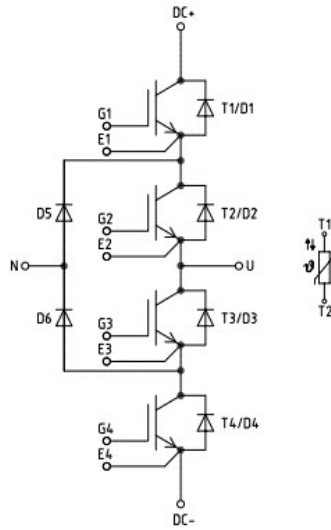
负温度系数热敏电阻 温度特性

NTC-Thermistor-temperature characteristic (typical)

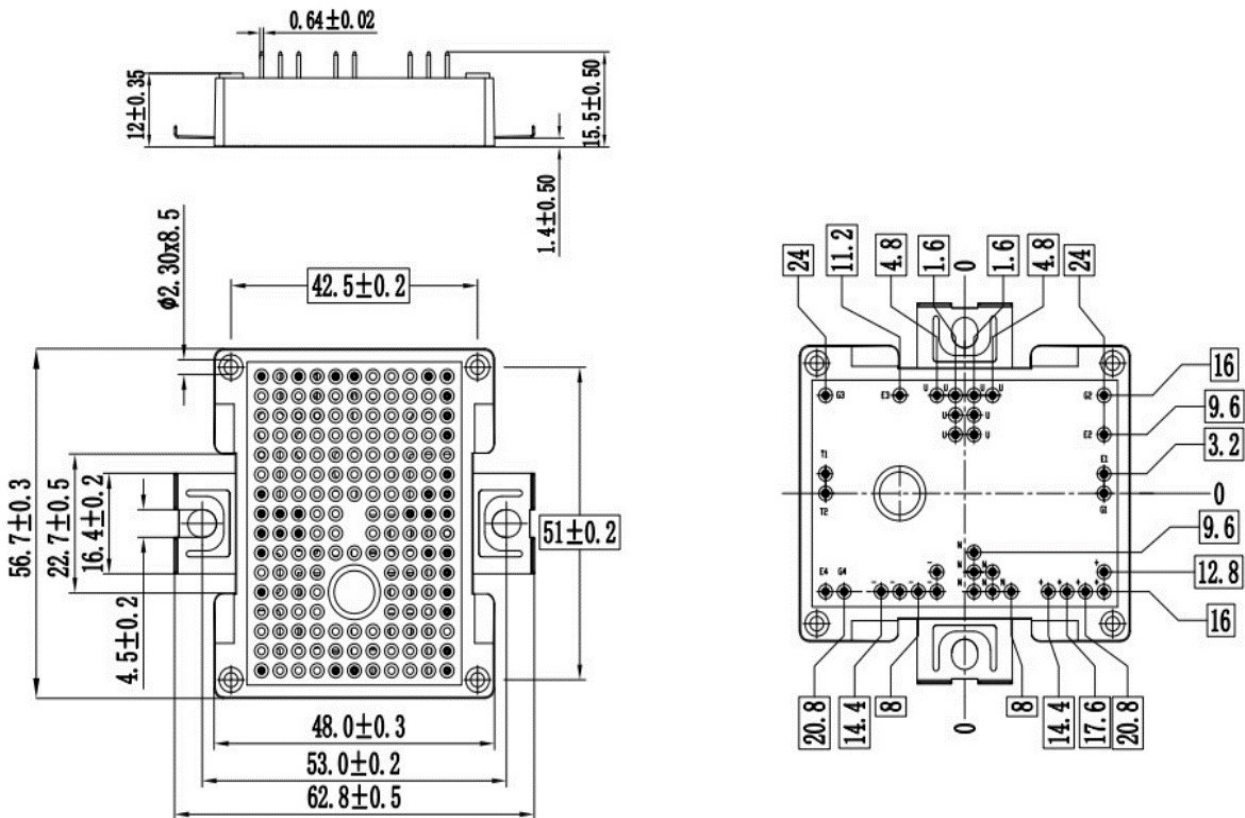
$$R = f(T)$$



Circuit diagram headline / 接线图



Package outlines / 封装尺寸



Dimensions in (mm)
单位: mm