

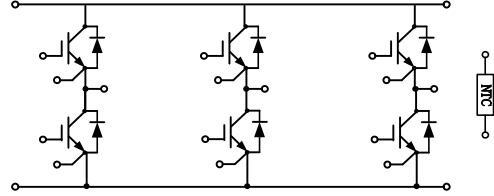
## SixPack IGBT Module

### 电气特性:

- 1200V 沟槽栅/场终止工艺
- 低开关损耗
- 正温度系数

### 典型应用:

- 变频器
- 伺服
- 逆变器



$V_{CES} = 1200V$ ,  $I_{C\ nom} = 150A$  /  $I_{CRM} = 300A$

## IGBT, 逆变器 / IGBT, Inverter

### 最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
集电极-发射极电压 Collector-Emitter voltage	$T_{vj}=25^{\circ}C$	$V_{CES}$	1200	V
连续集电极直流电流 Continuous DC collector current	$T_C=100^{\circ}C$ , $T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	150	A
集电极重复峰值电流 Repetitive peak collector current	$t_p=1\ ms$	$I_{CRM}$	300	A
总功率损耗 Total power dissipation	$T_C = 25^{\circ}C$ , $T_{vj\ max} = 175^{\circ}C$	$P_{tot}$	750	W
栅极-发射极电压 Gate emitter voltage		$V_{GE}$	+/-20	V

### 特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
集电极-发射极饱和电压 Collector-Emitter saturation voltage	$V_{GE}=15V$ , $I_C=150A$ $V_{GE}=15V$ , $I_C=150A$ $V_{GE}=15V$ , $I_C=150A$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$V_{CESat}$	2.12 2.53 2.65	2.55	V
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C=5.3mA$ , $V_{GE}=V_{CE}$	$T_{vj}=25^{\circ}C$	$V_{GE(th)}$	5.20	5.80 6.40	
栅电荷 Gate charge	$V_{GE}=-15V...+15V$		$Q_G$	0.69		$\mu C$

内部栅极电阻 Internal gate resistor		$R_{Gint}$		3.50		$\Omega$
输入电容 Input capacitance	$f=1\text{MHz}$ $V_{CE}=25\text{V}, V_{GE}=0\text{V}$	$T_{vj}=25^\circ\text{C}$	$C_{ies}$	11.36		nF
反向传输电容 Reverse transfer capacitance			$C_{res}$	0.41		
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}$	$T_{vj}=25^\circ\text{C}$	$I_{CES}$		1	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE}=0\text{V}, V_{GE}=20\text{V}$	$T_{vj}=25^\circ\text{C}$	$I_{GES}$		150	nA
开通延迟时间 Turn-on delay time	$I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload)	$T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$	$t_{don}$		99	
					114	
					120	
上升时间 Rise time	$I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload)	$T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$	$t_r$		28	ns
					32	
					33	
关断延迟时间 Turn-off delay time	$I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload)	$T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$	$t_{doff}$		240	
					266	
					294	
下降时间 Fall time	$I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload)	$T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$	$t_f$		178	
					215	
					250	
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	$I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload)	$T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$	$E_{on}$		1.32	mJ
					2.37	
					3.25	
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	$I_C=150\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=2\Omega$ (电感负载)/(inductiveload)	$T_{vj}=25^\circ\text{C}$ $T_{vj}=125^\circ\text{C}$ $T_{vj}=150^\circ\text{C}$	$E_{off}$		8.75	
					10.86	
					12.42	
短路数据 SC data	$V_{GE}\leq 15\text{V}, V_{CC}=800\text{V}$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt, t_p\leq 10\mu\text{s}$ $T_{vj}=150^\circ\text{C}$		$I_{SC}$		563	A
结-外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		$R_{thJC}$		0.20	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vjop}$	-40	150	$^\circ\text{C}$

## 二极管, 逆变器 / Diode, Inverter

### 最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj}=25^\circ\text{C}$	$V_{RRM}$	1200	V
连续正向直流电流 Continuous DC forward current		$I_F$	150	A
正向重复峰值电流 Repetitive peak forward current	$t_p=1\text{ms}$	$I_{FRM}$	300	A
$I^2t$ 值 $I^2t$ -value	$t_p=10\text{ms}, \sin 180^\circ, T_{vj}=125^\circ\text{C}$	$I^2t$	4050	$\text{A}^2\text{s}$

## 特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=150A, V_{GE}=0V$ $I_F=150A, V_{GE}=0V$ $I_F=150A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$V_F$	2.80 3.12 3.10	3.25	V
反向恢复峰值电流 Peak reverse recovery current	$I_F=150A,$ $-di_F/dt=4900A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$I_{RM}$	155 187 213		A
恢复电荷 Recovered charge	$I_F=150A,$ $-di_F/dt=4900A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$Q_r$	8.00 13.00 20.00		$\mu C$
反向恢复损耗（每脉冲） Reverse recovered energy	$I_F=150A,$ $-di_F/dt=4900A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$E_{rec}$	3.00 6.60 8.60		mJ
结-外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		$R_{thJC}$		0.375	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj op}$	-40	150	$^{\circ}C$

负温度系数热敏电阻 / NTC-Thermistor

## 特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
额定电阻值 Rated resistances	$T_c=25^{\circ}C, \pm 5\%$	$R_{25}$		5.0		K $\Omega$
B-值 B-value	$\pm 1\%$	$B_{25/50}$		3380		K

模块 / Module

Parameter	Conditions	Symbol	Value			Unit
绝缘测试电压 Isolation test voltage	RMS, $f=50Hz, t=1min$	$V_{ISOL}$	2500			V
内部绝缘 Internal isolation			$Al_2O_3$			
储存温度 Storage temperature		$T_{stg}$	-40		125	$^{\circ}C$
模块安装的扭矩 Mounting torque for modul mounting		M	3.0		6.0	Nm
重量 Weight		W		301		g

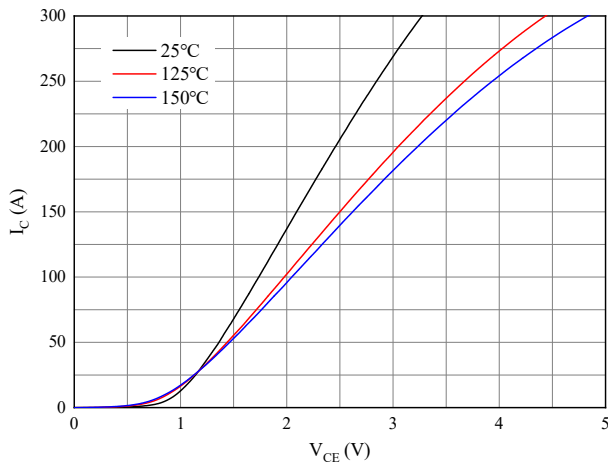


图 1. 输出特性 逆变器 ( $V_{GE}=15V$ )

Figure 1. Output characteristics IGBT, Inverte

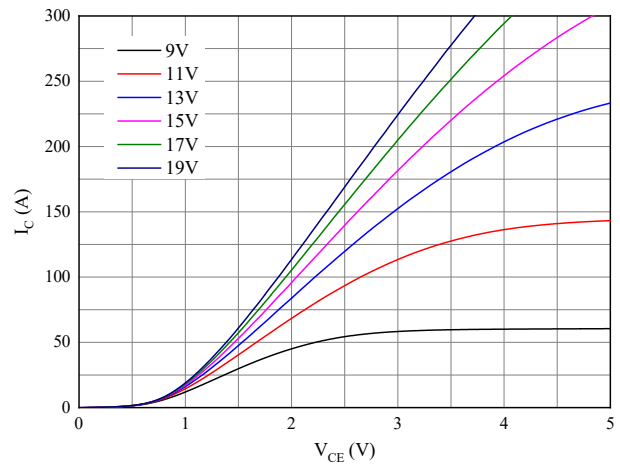


图 2. 输出特性 逆变器 ( $T_{vj}=150^{\circ}C$ )

Figure 2. Output characteristics IGBT, Inverter

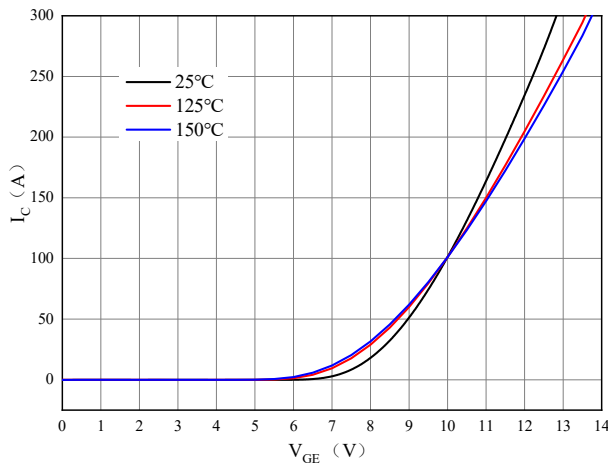


图 3. 传输特性 逆变器 ( $V_{GE}=15V$ )

Figure 3. Transfer characteristics IGBT, Inverter

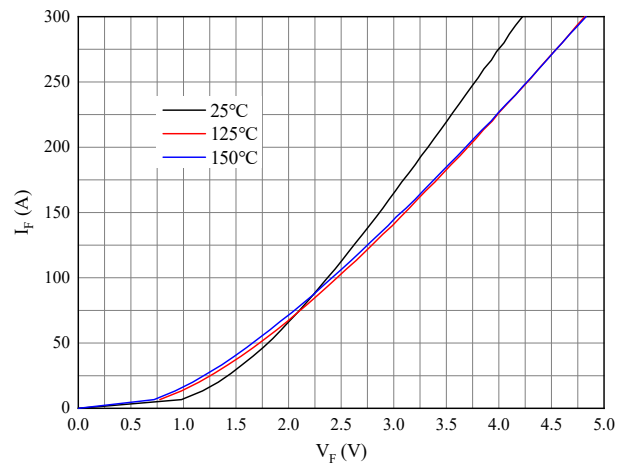


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

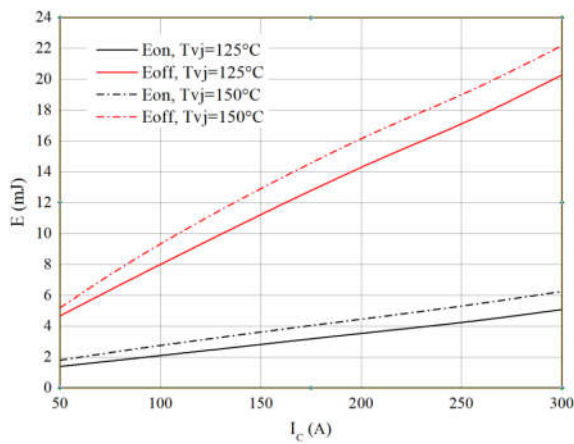


图 5. 开关损耗 逆变器

Figure 5. Switching losses of IGBT

$V_{GE}=\pm 15V, R_{Gon}=2\Omega, R_{Goff}=2\Omega, V_{CE}=600V$

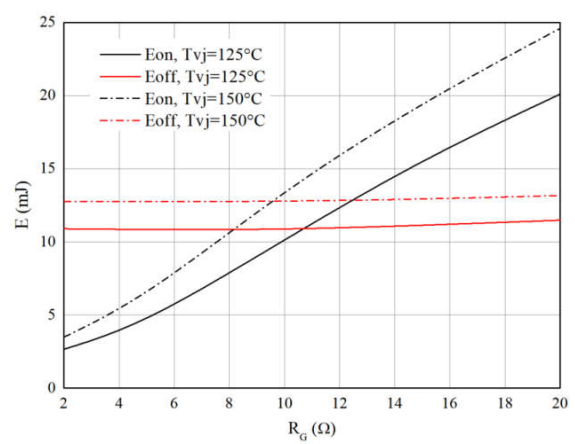


图 6. 开关损耗 逆变器

Figure 6. Switching losses of IGBT

$V_{GE}=\pm 15V, I_C=150A, V_{CE}=600V$

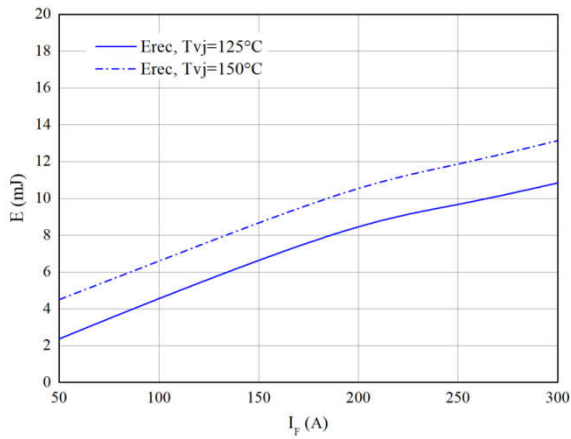


图 7. 开关损耗 二极管

Figure 7. Switching losses of Diode

$R_{Gon}=2\Omega, V_{CE}=600V$

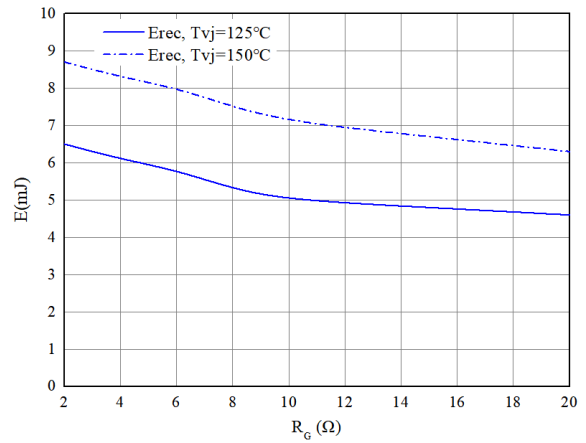


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode

$I_F=150A, V_{CE}=600V$

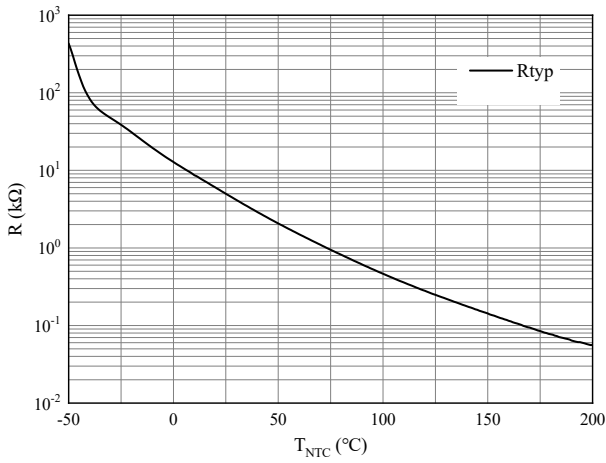


图 9. 负温系数热敏电阻 温度特性

Figure 9. NTC-Themistor-temperature characteristic

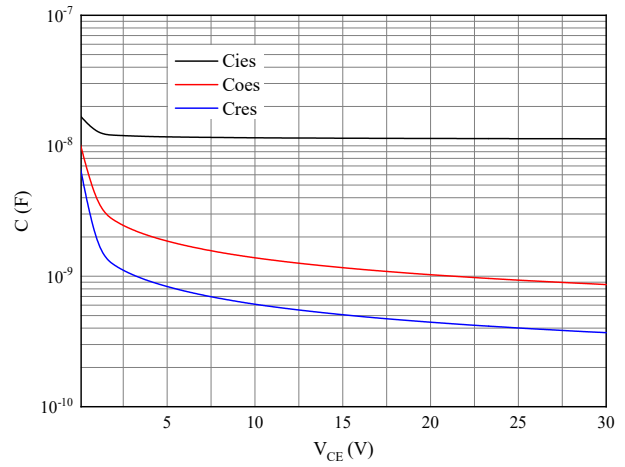
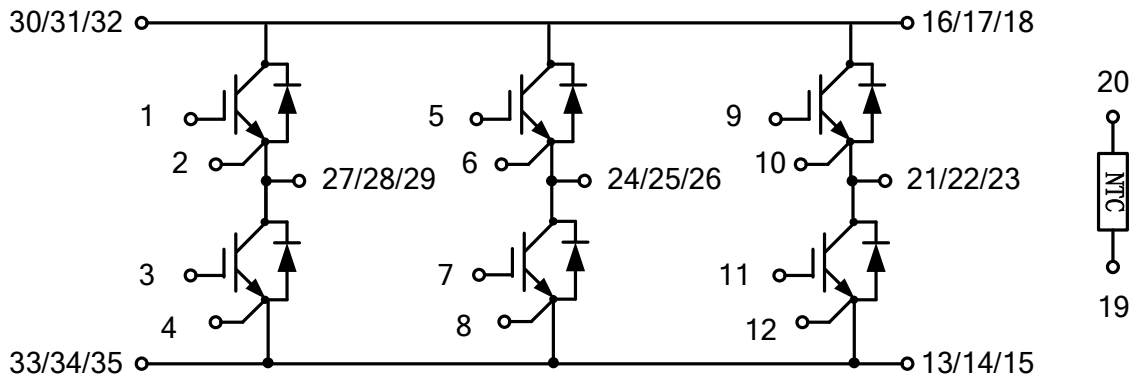


图 10. 电容特性

Figure 10. Capacitance characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines

