SixPack IGBT Module

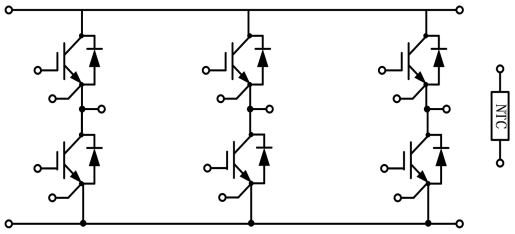
电气特性:

- 1200V 沟槽栅/场终止工艺

  1200V trench gate/field termination process
- 低开关损耗

  Low switching losses
- Vcesat 正温度系数

  Vcesat has a positive temperature coefficient



典型应用:

- 变频器

  Power Converters
- 伺服电机

  Servo Drives
- 逆变器

  Inverter

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°C	V_{CES}	1200	V
连续集电极直流电流 Continuous DC collector current	T_C=100°C, $T_{vj\ max}$=175°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
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°C T_{vj}=125°C T_{vj}=150°C	V_{CEsat}		1.53 1.75 1.81	2.10	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°C	$V_{GE(th)}$	5.20	5.80	6.40	
栅电荷 Gate charge	V_{GE}=-15V…+15V		Q_G		1.56		µC
内部栅极电阻 Internal gate resistor	Tvj=25°C		R_{Gint}		1.10		Ω
输入电容 Input capacitance	f=100KHz V_{CE}=25V, V_{GE}=0 V	T_{vj}=25°C	C_{ies}		23.82		nF
反向传输电容 Reverse transfer capacitance			C_{res}		0.22		
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE}=1200V , V_{GE}= 0 V	T_{vj}=25°C	I_{CES}			1	mA
栅极-发射极漏电流 Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V	T_{vj}=25°C	I_{GES}			100	nA
开通延迟时间 Turn-on delay time	I_C=150A, V_{CE}=600 V V_{GE}=±15 V, R_G=5Ω (电感负载) /(inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ on}$		102 103 104		ns
上升时间 Rise time	I_C=150A, V_{CE}=600 V V_{GE}=±15 V, R_G=5Ω (电感负载) /(inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_r		47 55 56		
关断延迟时间 Turn-off delay time	I_C=150A, V_{CE}=600 V V_{GE}=±15 V, R_G=5Ω (电感负载) /(inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ off}$		337 381 397		
下降时间 Fall time	I_C=150A, V_{CE}=600 V V_{GE}=±15 V, R_G=5Ω (电感负载) /(inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_f		180 257 275		
开通损耗能量（每脉冲） Turn-on energy loss per pulse	I_C=150A, V_{CE}=600 V V_{GE}=±15 V, R_G=5Ω di/dt=2150A/µs(Tvj=150°C) (电感负载) /(inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{on}		11.09 19.92 22.71		mJ
关断损耗能量（每脉冲） Turn-off energy loss per pulse	I_C=150A, V_{CE}=600 V V_{GE}=±15V,R_G=5Ω du/dt=4250V/µs(Tvj=150°C) (电感负载) /(inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{off}		10.18 13.54 14.45		
短路数据 SC data	V_{GE}≤15V, Vcc=800V V_{CEmax}=V_{CES}-L_{sCE}·di/dt,t_P≤10us, T_{vj}=150°C		I_{SC}		730		A
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		150	°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}=25ºC	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=1ms	I_{FRM}	300	A
I^2t 值 I^2t-value	t_p=10ms， sin180°，T_{vj}=125ºC	I^2t	8000	A^2s

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°C T_{vj}=125°C T_{vj}=150°C	V_F		2.05 1.75 1.67	2.40	V
反向恢复峰值电流 Peak reverse recovery current	I_F=150A, -di$_F$/dt=2150A/µs(T_{vj}=150°C) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	I_{RM}		138 189 198		A
恢复电荷 Recovered charge	I_F=150A, -di$_F$/dt=2150A/µs(T_{vj}=150°C) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	Q_r		11.67 29.77 35.09		µC
反向恢复损耗（每脉冲） Reverse recovered energy	I_F=150A, -di$_F$/dt=2150A/µs(T_{vj}=150°C) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{rec}		3.37 9.26 11.07		mJ
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		150	°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°C，±5%	R_{25}		5.0		kΩ
B-值 B-value	±1%	$B_{25/50}$		3380		K

模块 / Module

Parameter	Conditions	Symbol	Value			Unit
绝缘测试电压 Isolation test voltag	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	°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

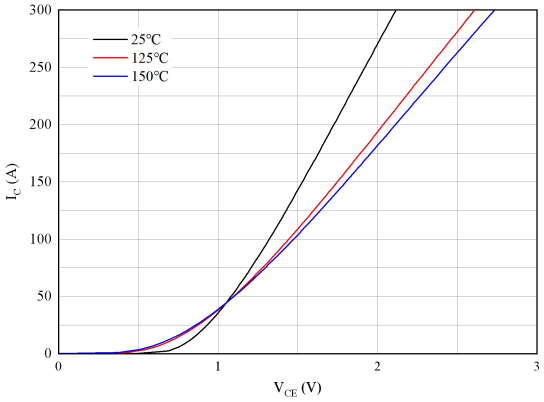


图 1. 输出特性 逆变器 (V_{GE}=15V)

Figure 1. Output characteristics IGBT, Inverter

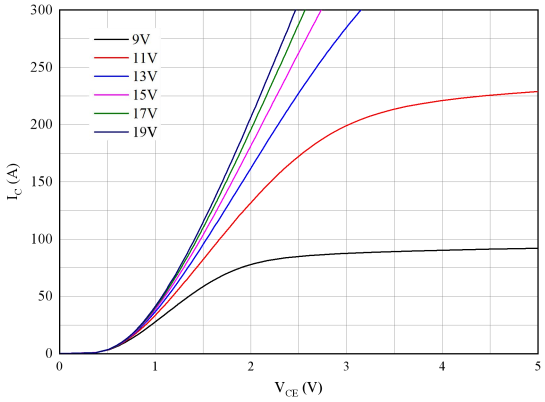


图 2. 输出特性 逆变器 (T_{vj}=150℃)

Figure 2. Output characteristics IGBT, Inverter

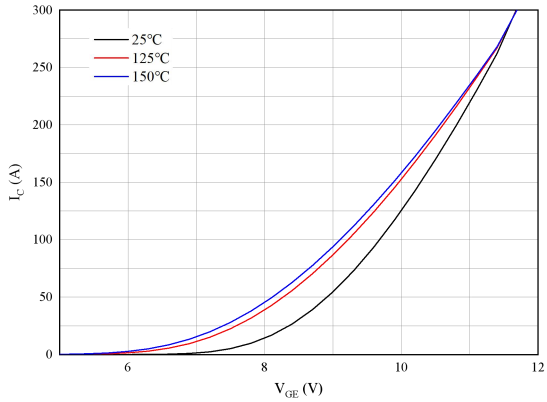


图 3.传输特性 逆变器 (V_{CE}=20V)

Figure 3. Transfer characteristics IGBT, Inverter

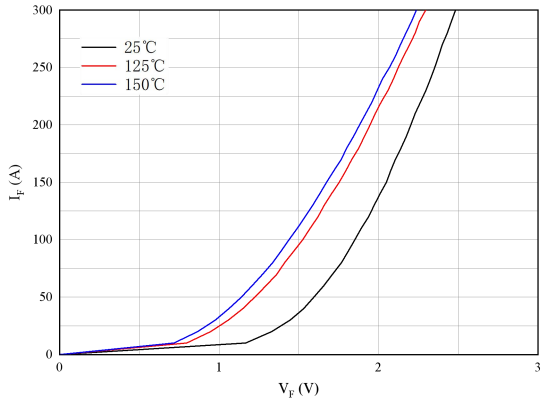


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

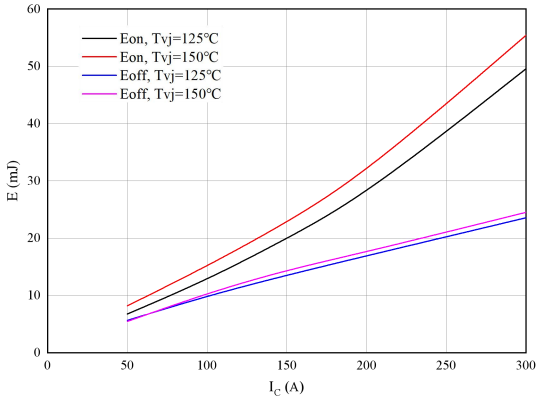


图 5. 开关损耗 逆变器

Figure 5. Switching losses of IGBT

V_{GE}=±15V, R_{Gon}=5Ω, R_{Goff}=5Ω, V_{CE}=600V

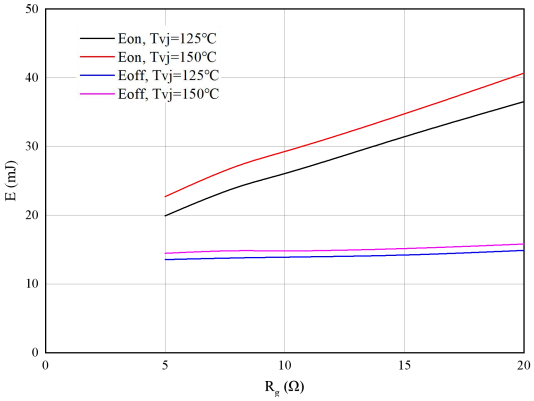


图 6. 开关损耗 逆变器

Figure 6. Switching losses of IGBT

V_{GE}=±15V, I_C=150A, V_{CE}=600V

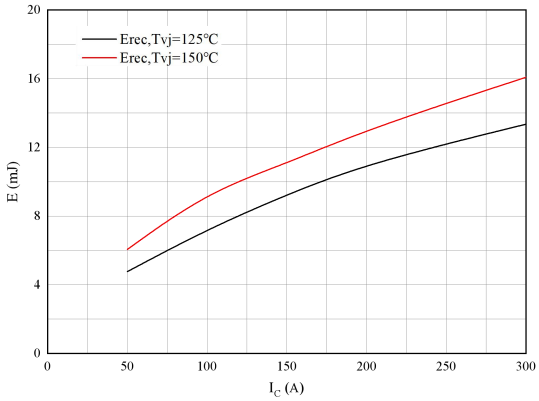


图 7. 开关损耗 二极管

Figure 7. Switching losses of Diode

R_{Gon}=5Ω, R_{Goff}=5Ω,V_{CE}=600V

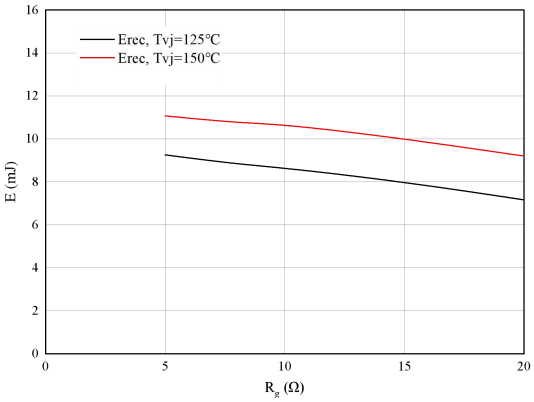


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode

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

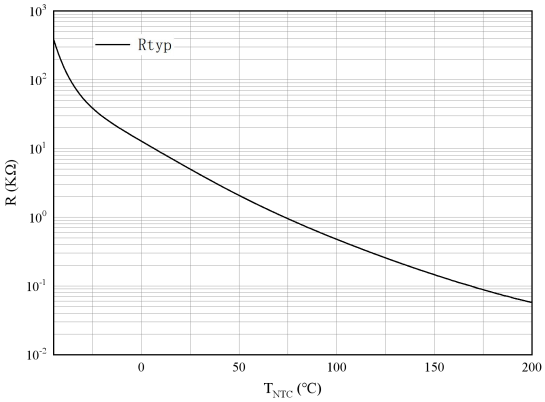


图 9. 负温系数热敏电阻 温度特性

Figure 9. NTC-Themistor-temperature characteristic

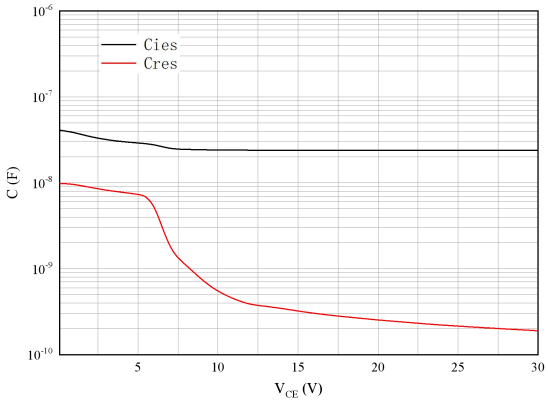
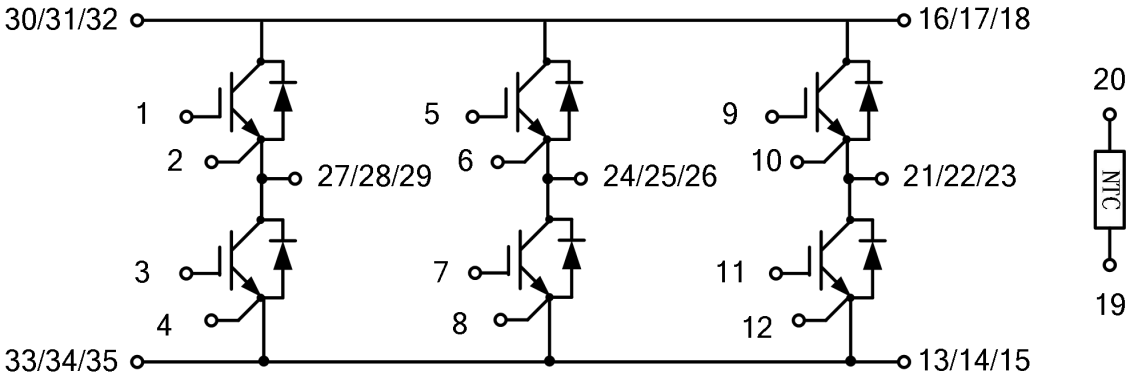


图 10. 电容特性

Figure 10. Capacitance characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines