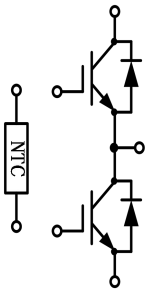
Half Bridge IGBT Module

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
- UPS
- 伺服
- 逆变器



V_{CES} =1200V，$I_{C\ nom}$ =600A / I_{CRM} =1200A

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	$I_{C\ nom}$	600	A
集电极重复峰值电流 Repetitive peak collector current	t_P= 1 ms	I_{CRM}	1200	A
总功率损耗 Total power dissipation	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	7900	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=600A V_{GE}=15V, I_C=600A V_{GE}=15V, I_C=600A	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$V_{CE\ sat}$		1.78 2.07 2.13	2.10	V
栅极-发射极阈值电压 Gate-Emitter threshold voltage	I_C=23mA, V_{GE}= V_{CE}，	T_{vj}=25°C	V_{GEth}	5.2	5.8	6.4	
栅电荷 Gate charge	V_{GE}=-15V…+15V		Q_G		5.55		µC
内部栅极电阻 Internal gate resistor	T_{vj}=25°C		R_{Gint}		1.34		Ω

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输入电容 Input capacitance	f=1MHz, V_{CE}=25V, V_{GE}=0 V T_{vj}=25°C	C_{ies}		47.07		nF
反向传输电容 Reverse transfer capacitance		C_{res}		2.20		
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}			2	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}			200	nA
开通延迟时间 Turn-on delay time	I_C=600 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (电感负载) / (inductive load) T_{vj}=150°C	$t_{d\,on}$		312 334 363		ns
上升时间 Rise time	I_C=600 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (电感负载) / (inductive load) T_{vj}=150°C	t_r		194 200 202		
关断延迟时间 Turn-off delay time	I_C=600 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (电感负载) / (inductive load) T_{vj}=150°C	$t_{d\,off}$		582 647 697		
下降时间 Fall time	I_C=600 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (电感负载) / (inductive load) T_{vj}=150°C	t_f		105 138 173		
开通损耗能量（每脉冲） Turn-on energy loss per pulse	I_C=600 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1.5Ω T_{vj}=25°C di/dt=2379A/μs (Tvj = T_{vj}=125°C 150°C) T_{vj}=150°C (电感负载) / (inductive load)	E_{on}		93.35 119.5 130.1		mJ
关断损耗能量（每脉冲） Turn-off energy loss per pulse	I_C=600 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1.5Ω T_{vj}=25°C dv/dt=3121V/μs(Tvj = T_{vj}=125°C 150°C) T_{vj}=150°C (电感负载) / (inductive load)	E_{off}		61.57 71.01 76.53		mJ
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}		3000		A
结-外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT	R_{thJC}			0.019	K/W
在开关状态下温度 Temperature under switching conditions		Tvj 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}=25°C	V_{RRM}	1200	V
连续正向直流电流 Continuous DC forward current		I_F	600	A
正向重复峰值电流 Repetitive peak forward current	t_p=1ms	I_{FRM}	1200	A
I^2t 值 I^2t-value	t_p=10ms，sin180°，T_j=125°C	I^2t	38500	A^2s

特征值 / Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
正向电压 Forward voltage	I_F=600A, V_{GE}=0V I_F=600A, V_{GE}=0V I_F=600A, V_{GE}=0V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_F		2.44 2.55 2.50	2.70	V
反向恢复峰值电流 Peak reverse recovery current	I_F=600A, -di$_F$/dt=2379A/µs V_R=600V V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	I_{RM}		144 208 240		A
恢复电荷 Recovered charge	I_F=600A, -di$_F$/dt=2379A/µs V_R=600V V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	Q_r		19.70 51.44 63.30		µC
反向恢复损耗（每脉冲） Reverse recovered energy	I_F=600A, -di$_F$/dt=2379A/µs V_R=600V V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{rec}		4.79 14.37 17.93		mJ
结-外壳热阻 Thermal resistance, junction to case	每个 Diode / per diode		R_{thJC}			0.028	K/W
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	±2%	$B_{25/50}$		3375		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	°C
模块安装的扭矩 Mounting torque for modul mounting		M	3.0		6.0	Nm
端子连接扭矩 Terminal Connection Torque		M	3.0		6.0	Nm
重量 Weight		W		341		g

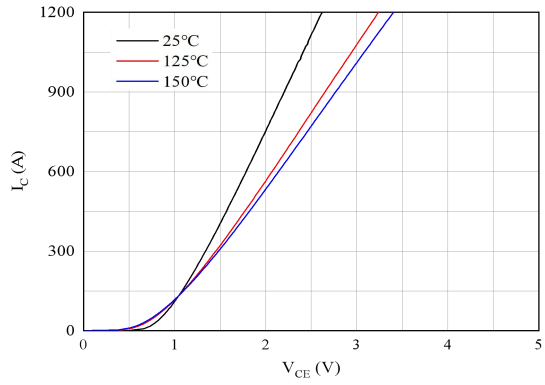


图 1. 典型输出特性 (V_{GE}=15V)

Figure 1. Typical output characteristics (V_{GE}=15V)

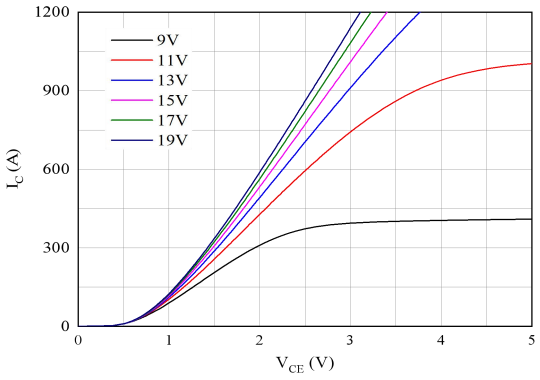


图 2. 典型输出特性 (T_{vj}=150℃)

Figure 2. Typical output characteristics (T_{vj}=150℃)

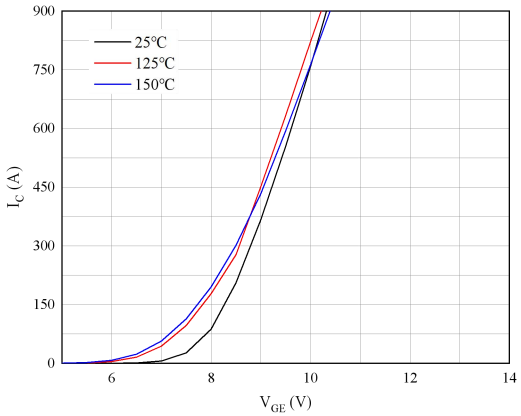


图 3. 典型传输特性(V_{CE}=20V)

Figure 3. Typical transfer characteristic(V_{CE}=20V)

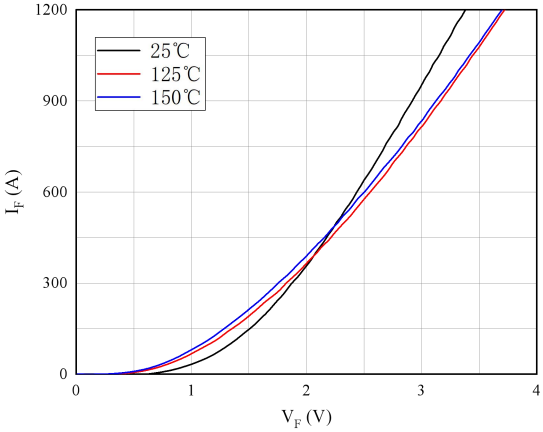


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

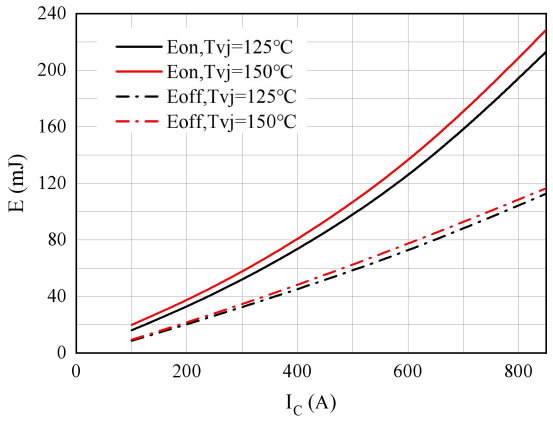


图 5. 开关损耗 逆变器

Figure 5. Switching losses of IGBT

VGE=±15V, RGon=1.5Ω, RGoff=1.5Ω, VCE=600V

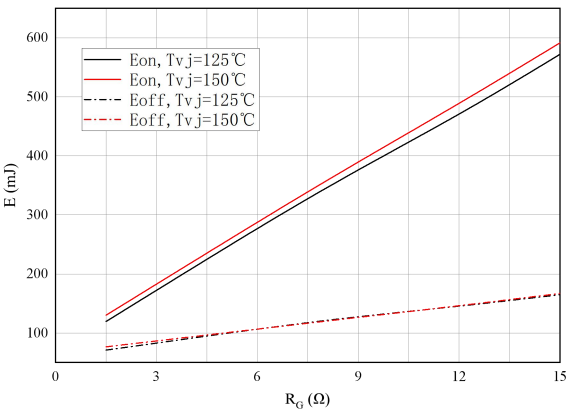


图 6. 开关损耗 逆变器

Figure 6. Switching losses of IGBT

VGE=±15V, I_C=600A , VCE=600V

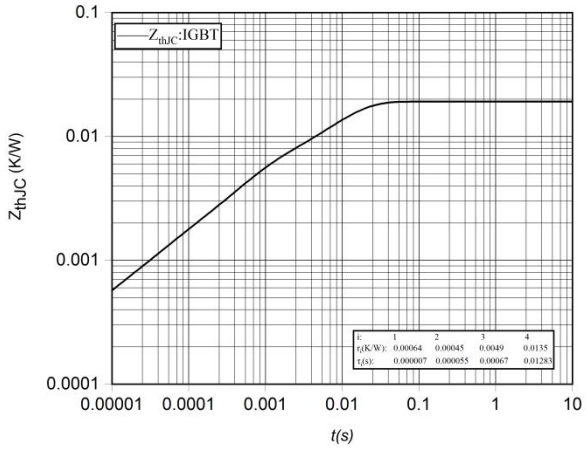


图 7. 瞬态热阻抗 IGBT 逆变器

Figure 7. Transient thermal impedance IGBT,Inverter

$Z_{thJC}=f(t)$

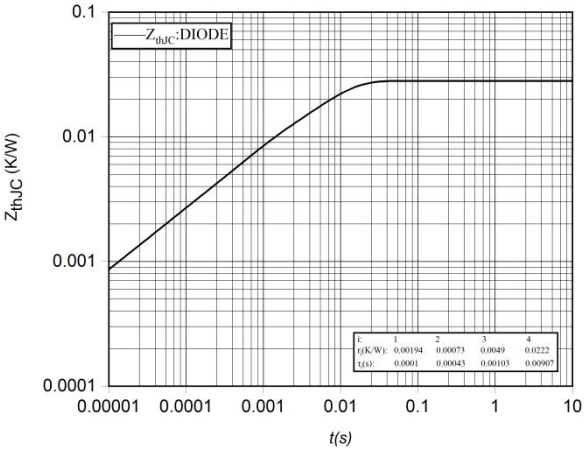


图 8. 瞬态热阻抗 FRD 逆变器

Figure 8. Transient thermal impedance FRD,Inverter

$Z_{thJC}=f(t)$

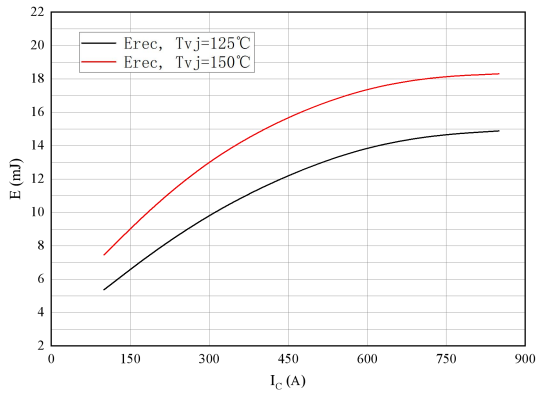


图 9. 开关损耗 二极管

Figure 9. Switching losses of Diode

RGon=1.5Ω, VCE=600V

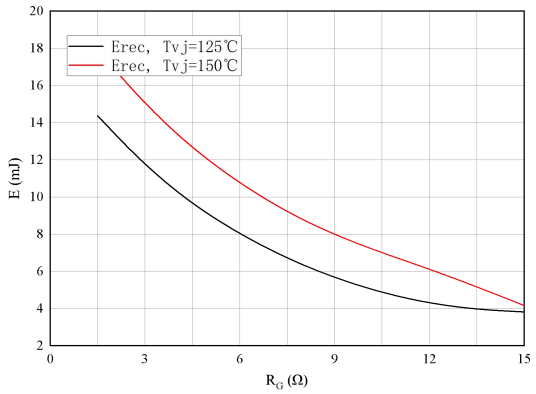


图 10. 开关损耗 二极管

Figure 10. Switching losses of Diode

IF=600A, VCE=600V

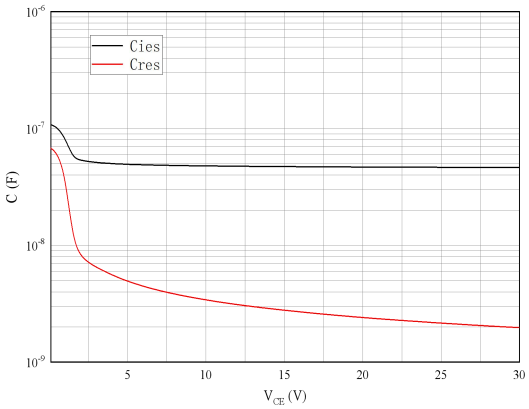


图 11. 电容特性

Figure 11. Capacitance characteristic

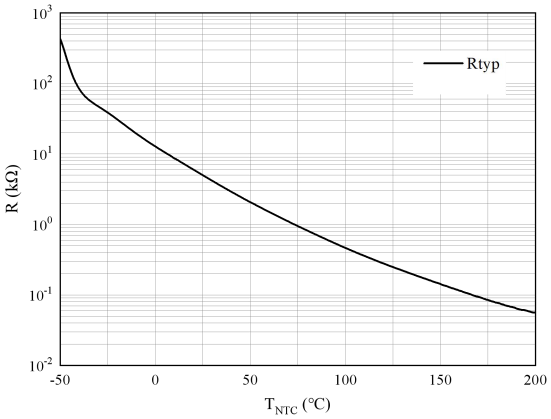
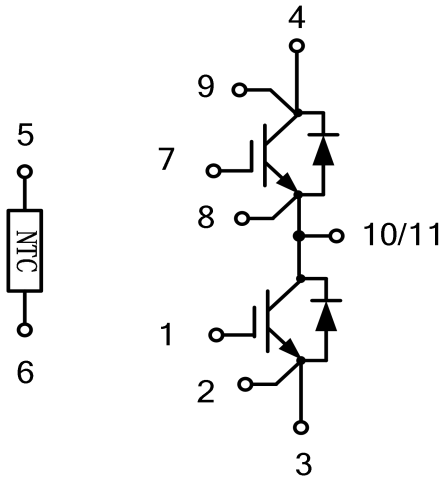


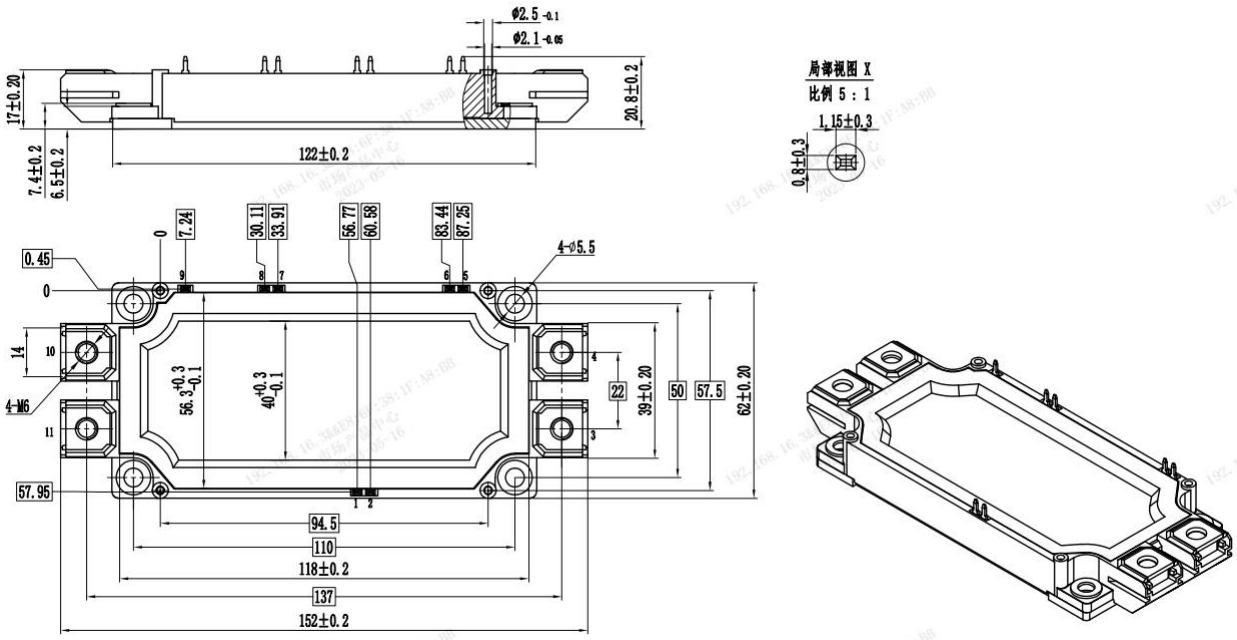
图 12. 负温系数热敏电阻 温度特性

Figure10. NTC-Thermistor-temperaturecharacteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines



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