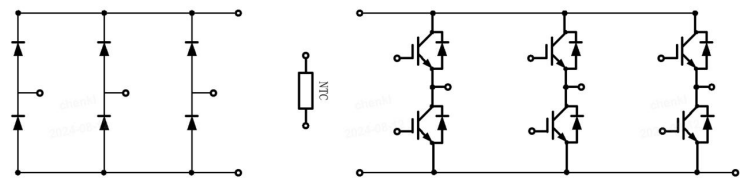


PIM IGBT Module

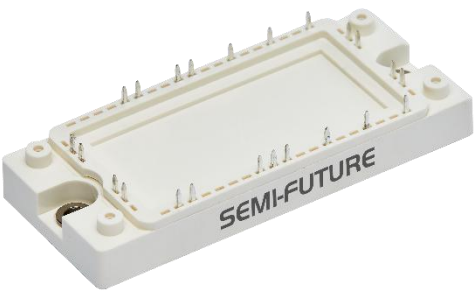
电气特性:

- 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



$V_{CES} = 1200V$, $I_{C\ nom} = 40A$ / $I_{CRM} = 80A$

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	$T_C=100^{\circ}C$, $T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	40	A
集电极重复峰值电流 Repetitive peak collector current	$t_p=1\ ms$	I_{CRM}	80	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	$V_{GE}=15V$, $I_C=40A$ $V_{GE}=15V$, $I_C=40A$ $V_{GE}=15V$, $I_C=40A$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	V_{CEsat}	1.78 2.11 2.17	2.3	V
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C=1.5mA$, $V_{GE}=V_{CE}$	$T_{vj}=25^{\circ}C$	$V_{GE(th)}$	5.3	5.8	6.4
内部栅极电阻 Internal gate resistor			R_{Gint}	None		Ω

输入电容 Input capacitance	f=100KHz, $V_{CE}=25\text{ V}$, $V_{GE}=0\text{ V}$ $T_{vj}=25^{\circ}\text{C}$	C_{ies}		2.71		nF
反向传输电容 Reverse transfer capacitance		C_{res}		0.13		
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}			100	nA
开通延迟时间 Turn-on delay time	$I_C=40\text{ A}$, $V_{CE}=600\text{ V}$ $T_{vj}=25^{\circ}\text{C}$ $V_{GE}=\pm 15\text{ V}$, $R_G=30\Omega$ $T_{vj}=125^{\circ}\text{C}$ (电感负载) / (inductive load) $T_{vj}=150^{\circ}\text{C}$	t_{don}		67 60 56		ns
上升时间 Rise time	$I_C=40\text{ A}$, $V_{CE}=600\text{ V}$ $T_{vj}=25^{\circ}\text{C}$ $V_{GE}=\pm 15\text{ V}$, $R_G=30\Omega$ $T_{vj}=125^{\circ}\text{C}$ (电感负载) / (inductive load) $T_{vj}=150^{\circ}\text{C}$	t_r		52 53 55		
关断延迟时间 Turn-off delay time	$I_C=40\text{ A}$, $V_{CE}=600\text{ V}$ $T_{vj}=25^{\circ}\text{C}$ $V_{GE}=\pm 15\text{ V}$, $R_G=30\Omega$ $T_{vj}=125^{\circ}\text{C}$ (电感负载) / (inductive load) $T_{vj}=150^{\circ}\text{C}$	t_{doff}		326 370 379		
下降时间 Fall time	$I_C=40\text{ A}$, $V_{CE}=600\text{ V}$ $T_{vj}=25^{\circ}\text{C}$ $V_{GE}=\pm 15\text{ V}$, $R_G=30\Omega$ $T_{vj}=125^{\circ}\text{C}$ (电感负载) / (inductive load) $T_{vj}=150^{\circ}\text{C}$	t_f		127 219 258		
开通损耗能量（每脉冲） Turn-on energy loss per pulse	$I_C=40\text{ A}$, $V_{CE}=600\text{ V}$ $T_{vj}=25^{\circ}\text{C}$ $V_{GE}=\pm 15\text{ V}$, $R_G=30\Omega$ $T_{vj}=125^{\circ}\text{C}$ $di/dt=550\text{ A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=150^{\circ}\text{C}$ (电感负载) / (inductive load)	E_{on}		4.39 6.28 6.89		mJ
关断损耗能量（每脉冲） Turn-off energy loss per pulse	$I_C=40\text{ A}$, $V_{CE}=600\text{ V}$ $T_{vj}=25^{\circ}\text{C}$ $V_{GE}=\pm 15\text{ V}$, $R_G=30\Omega$ $T_{vj}=125^{\circ}\text{C}$ $du/dt=4700\text{ V}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=150^{\circ}\text{C}$ (电感负载) / (inductive load)	E_{off}		2.00 3.01 3.30		
短路数据 SC data	$V_{GE}\leq 15\text{ V}$, $V_{cc}=650\text{ V}$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $t_p\leq 10\mu\text{s}$, $T_{vj}=150^{\circ}\text{C}$	I_{SC}		190		A
在开关状态下温度 Temperature under switching conditions		$T_{vj op}$	-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	40	A
正向重复峰值电流 Repetitive peak forward current	$t_p=1\text{ ms}$	I_{FRM}	80	A
I^2t 值 I^2t -value	$t_p=10\text{ ms}$, $\sin 180^{\circ}$, $T_j=125^{\circ}\text{C}$	I^2t	680	A^2s

特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=40A, V_{GE}=0V$ $I_F=40A, V_{GE}=0V$ $I_F=40A, V_{GE}=0V$ $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	V_F		2.11 1.77 1.70	2.55	V
反向恢复峰值电流 Peak reverse recovery current	$I_F=40A,$ $-di_F/dt=550A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$ $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	I_{RM}		24 40 43		A
恢复电荷 Recovered charge	$I_F=40A,$ $-di_F/dt=550A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$ $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	Q_r		0.97 6.37 7.70		μC
反向恢复损耗（每脉冲） Reverse recovered energy	$I_F=40A,$ $-di_F/dt=550A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=600V, V_{GE}=-15V$ $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	E_{rec}		0.08 1.89 2.35		mJ
在开关状态下温度 Temperature under switching conditions		$T_{vj\ op}$	-40		150	$^{\circ}C$

二极管，整流器 / Diode，Rectifier

最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C, I_{RRM}=0.05mA$	V_{RRM}	1600	V
反向不重复峰值电压 Non-Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C, I_{RRM}=0.05mA$	V_{RSM}	1800	V
最大正向平均电流 Maximum Average Forward Current	$T_s=80^{\circ}C, T_{vj}=25^{\circ}C$	$I_{F(AV)}$	35	A
正向浪涌电流 Surge forward current	$t_p=10ms, \sin 180^{\circ}, T_{vj}=125^{\circ}C$	I_{FSM}	530	A
I ² t 值 I ² t-value	$t_p=10ms, \sin 180^{\circ}, T_{vj}=125^{\circ}C$	I^2t	1400	A ² s

特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=40A, T_{vj}=25^{\circ}C$	V_F		1.16	1.40	V
反向电流 Reverse current	$V_R=V_{RRM}$ $T_{vj}=25^{\circ}C$	I_R			100	μA
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 _e =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 voltage	RMS, f=50Hz, t=1min	V _{ISOL}	2500			V
内部绝缘 Internal isolation			Al ₂ O 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		170		g

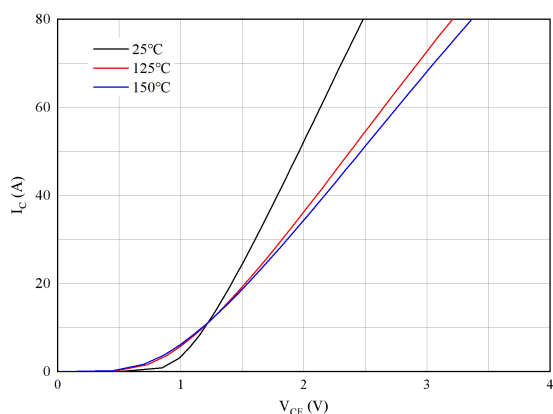
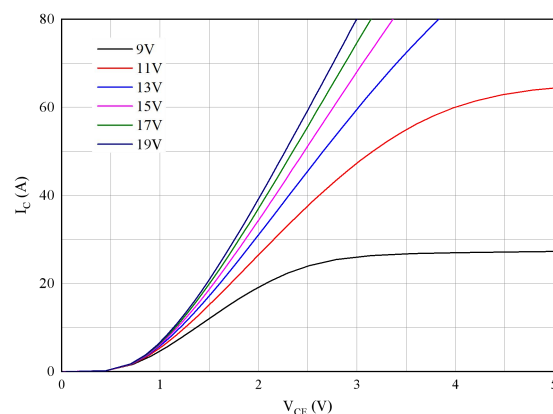
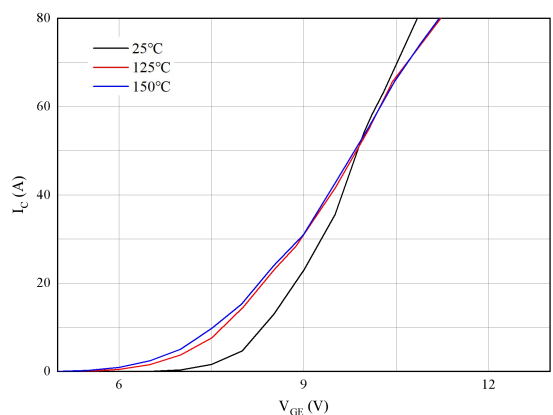
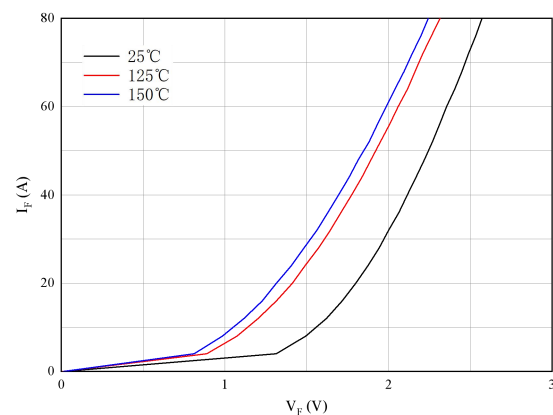
图 1. 典型输出特性($V_{GE}=15V$)Figure 1. Typical output characteristics ($V_{GE}=15V$)图 2. 典型输出特性 ($T_{vj}=150^{\circ}C$)Typical output characteristics ($T_{vj}=150^{\circ}C$)图 3. 典型传输特性($V_{CE}=20V$)Figure 3. Typical transfer characteristic($V_{CE}=20V$)

图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

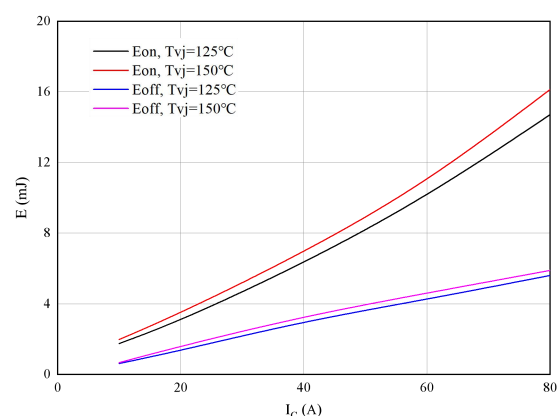


图 5. 开关损耗 逆变器

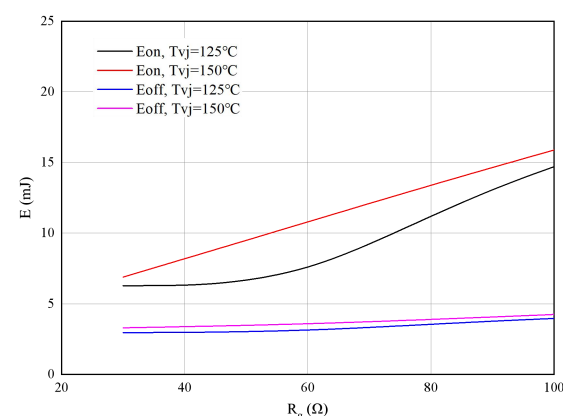
Figure 1. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $R_{gon}=30\Omega$, $R_{goff}=30\Omega$, $V_{CE}=600V$ 

图 6. 开关损耗 逆变器

Figure 2. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $I_C=40A$, $V_{CE}=600V$

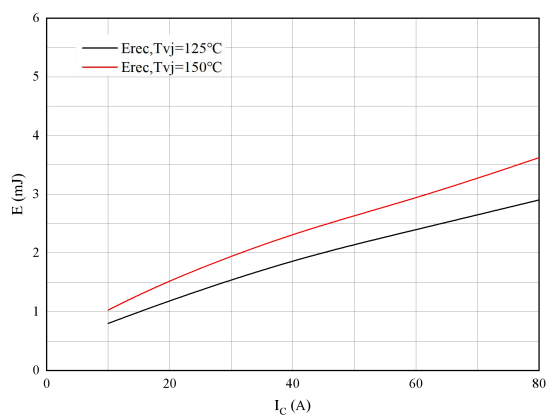


图 7. 开关损耗 二极管

Figure 3. Switching losses of Diode

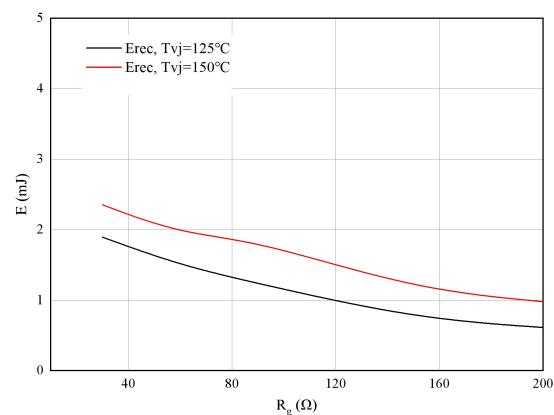
R_{gon}=30 Ω, V_{CE}=600V

图 8. 开关损耗 二极管

Figure 4. Switching losses of Diode

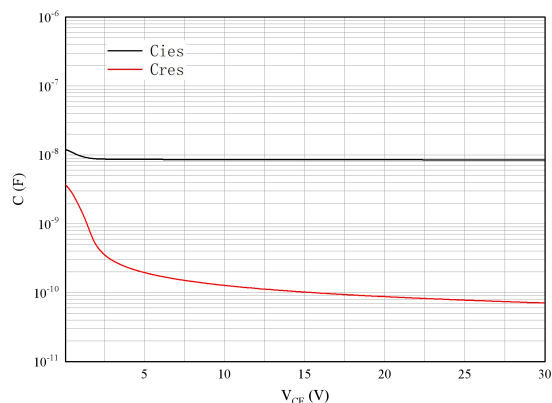
I_F=40A, V_{CE}=600V

图 9. 电容特性

Figure 9. Capacitance characteristic

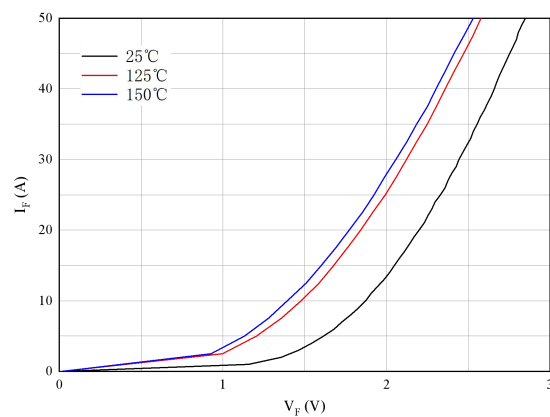


图 10. 正向偏压特性 斩波二极管

Figure 10. Forward characteristic of Diode

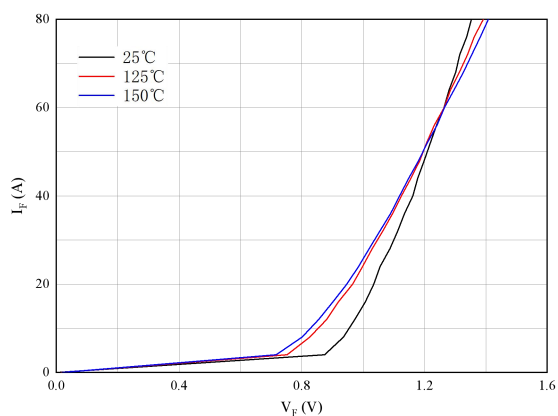


图 11. 正向偏压特性 整流二极管

Figure 11. Forward characteristic of Diode

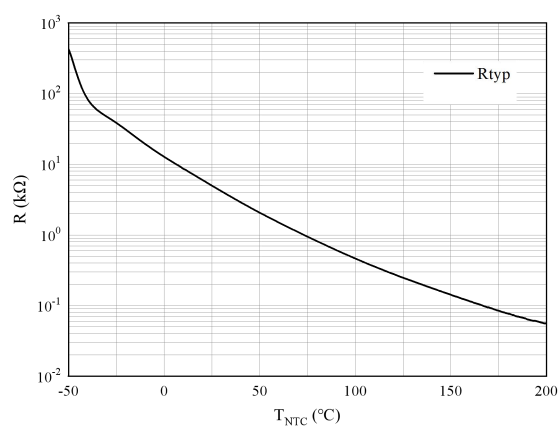
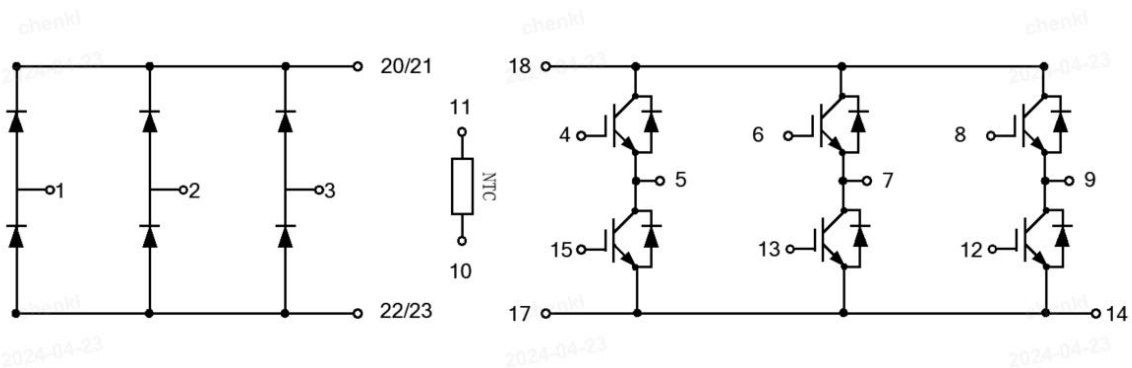


图 12. 负温系数热敏电阻 温度特性

Figure 12. NTC-Themistor-temperature characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines

