

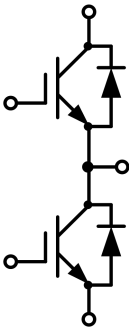
62mm Half Bridge IGBT Module

电气特性:

- 1700V 沟槽栅/场终止工艺
- 低开关损耗
- 正温度系数

典型应用:

- 高压变频器
- UPS
- 伺服
- 逆变器



$V_{CES}=1700V$ ， $I_{C\ nom}=400A$ / $I_{CRM}=800A$

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}	1700	V
连续集电极直流电流 Continuous DC collector current	$T_C=80^{\circ}C$, $T_{vj\ max}=150^{\circ}C$	$I_{C\ nom}$	400	A
集电极重复峰值电流 Repetitive peak collector current	$t_p=1\ ms$	I_{CRM}	800	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	$V_{GE}=15V$, $I_C=400A$ $T_{vj}=25^{\circ}C$ $V_{GE}=15V$, $I_C=400A$ $T_{vj}=125^{\circ}C$ $V_{GE}=15V$, $I_C=400A$ $T_{vj}=150^{\circ}C$	V_{CEsat}		2.05 2.45 2.55	2.45	V
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C=16mA$, $V_{GE}=V_{CE}$ $T_{vj}=25^{\circ}C$	$V_{GE(th)}$	5.2	5.8	6.4	
内部栅极电阻 Internal gate resistor		R_{Gint}		1.0		Ω

输入电容 Input capacitance	f=1MHz, V _{CE} =25 V, V _{GE} =0 V T _{vj} =25°C	C _{ies}		51.2		nF
反向传输电容 Reverse transfer capacitance		C _{res}		0.34		
集电极-发射极截止电流 Collector-emitter cut-off current	V _{CE} =1700V, 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}			400	nA
开通延迟时间 Turn-on delay time	I _C =400A, V _{CE} =900 V T _{vj} =25°C V _{GE} =±15 V, R _G =1Ω T _{vj} =125°C (电感负载) / (inductive load) T _{vj} =150°C	t _{d on}		139 180 185		ns
上升时间 Rise time	I _C =400A, V _{CE} =900 V T _{vj} =25°C V _{GE} =±15 V, R _G =1Ω T _{vj} =125°C (电感负载) / (inductive load) T _{vj} =150°C	t _r		41 54 56		
关断延迟时间 Turn-off delay time	I _C =400A, V _{CE} =900 V T _{vj} =25°C V _{GE} =±15 V, R _G =1Ω T _{vj} =125°C (电感负载) / (inductive load) T _{vj} =150°C	t _{d off}		260 321 336		
下降时间 Fall time	I _C =400A, V _{CE} =900 V T _{vj} =25°C V _{GE} =±15 V, R _G =1Ω T _{vj} =125°C (电感负载) / (inductive load) T _{vj} =150°C	t _f		303 521 554		
开通损耗能量（每脉冲） Turn-on energy loss per pulse	I _C =400A, V _{CE} =900 V T _{vj} =25°C di/dt=5600A/us (T _{vj} =150°C) T _{vj} =125°C V _{GE} =±15 V, R _G =1Ω T _{vj} =150°C (电感负载) / (inductive load)	E _{on}		67.5 99.0 107.3		mJ
关断损耗能量（每脉冲） Turn-off energy loss per pulse	I _C =400A, V _{CE} =900 V T _{vj} =25°C dv/dt=6400V/us (T _{vj} =150°C) T _{vj} =125°C V _{GE} =±15 V, R _G =1Ω T _{vj} =150°C (电感负载) / (inductive load)	E _{off}		48.2 75.6 80.6		
短路数据 SC data	V _{GE} ≤15V, V _{ce} =1000V V _{CEmax} =V _{CES} -L _{sCE} ·di/dt t _p ≤10us, T _{vj} =125°C	I _{SC}		2200		A
结-外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT	R _{thJC}			0.058	K/W
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} =25°C	V _{RRM}	1700	V
连续正向直流电流 Continuous DC forward current		I _F	400	A
正向重复峰值电流 Repetitive peak forward current	t _p =1ms	I _{FRM}	800	A
I ² t 值 I ² t-value	t _p =10ms, sin180°, T _j =125°C	I ² t	17000	A ² s

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特征值 / Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=400A, V_{GE}=0V$ $I_F=400A, V_{GE}=0V$ $I_F=400A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	V_F		1.80 2.00 2.05	2.20	V
反向恢复峰值电流 Peak reverse recovery current	$I_F=400A$ $-di_F/dt=7300A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=900V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	I_{RM}		541 469 456		A
恢复电荷 Recovered charge	$I_F=400A$ $-di_F/dt=7300A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=900V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	Q_r		91 143 158		μC
反向恢复损耗（每脉冲） Reverse recovered energy	$I_F=400A$ $-di_F/dt=7300A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=900V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	E_{rec}		49.6 83.6 93.1		mJ
结-外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			0.099	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		150	$^{\circ}C$

模块 / Module

Parameter	Conditions	Symbol	Value			Unit
绝缘测试电压 Isolation test voltage	RMS, f=50Hz, t=1min	V_{ISOL}	4000			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		320		g

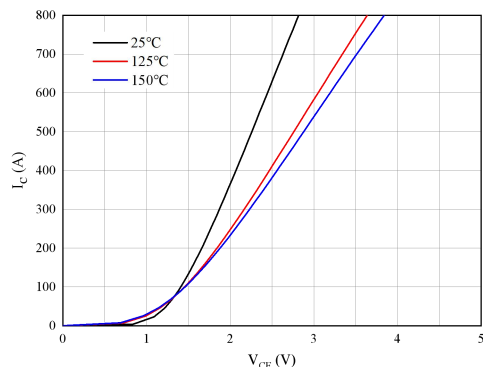


图 1. 典型输出特性 ($V_{GE}=15V$)

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

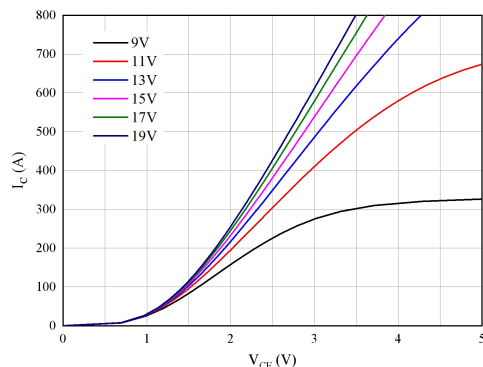


图 2. 典型输出特性 ($T_{vj}=150^{\circ}C$)

Figure 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

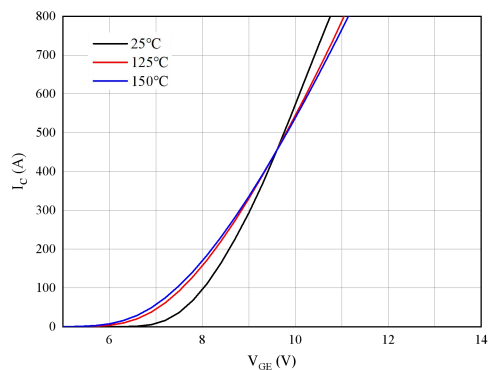


图 3. 典型传输特性($V_{CE}=20V$)

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

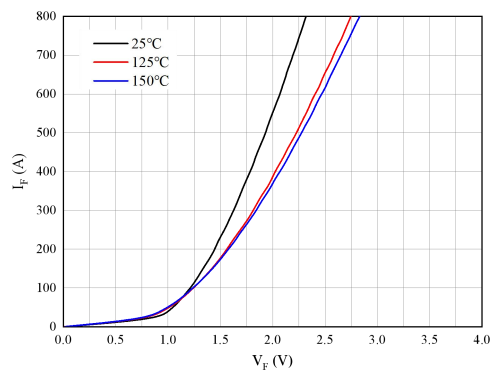


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

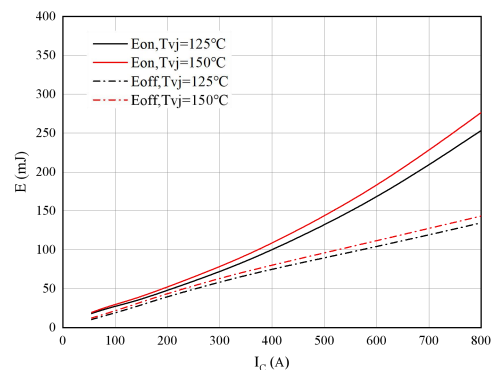


图 5. 开关损耗 逆变器

Figure 5. Switching losses of IGBT

$V_{GE}=\pm 15V$, $R_{Gon}=1\Omega$, $R_{Goff}=1\Omega$, $V_{CE}=900V$

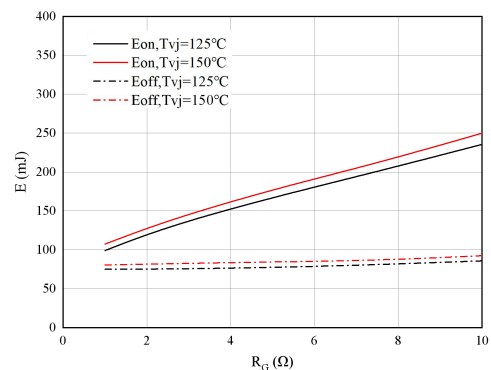


图 6. 开关损耗 逆变器

Figure 6. Switching losses of IGBT

$V_{GE}=\pm 15V$, $I_C=400A$, $V_{CE}=900V$

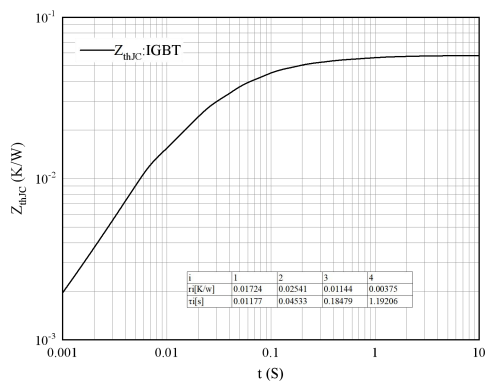


图 7. 瞬态热阻抗 IGBT 逆变器

Figure 7. Transient thermal impedance IGBT, Inverter
 $Z_{thJC}=f(t)$

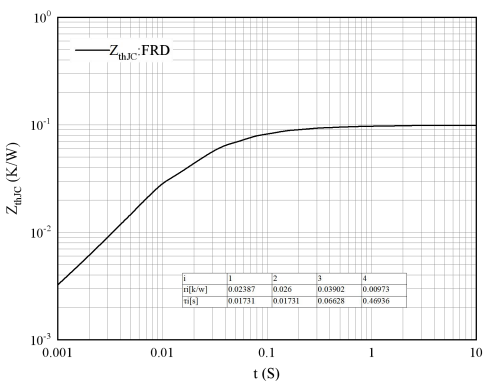


图 8. 瞬态热阻抗 FRD 逆变器

Figure 8. Transient thermal impedance FRD, Inverter
 $Z_{thJC}=f(t)$

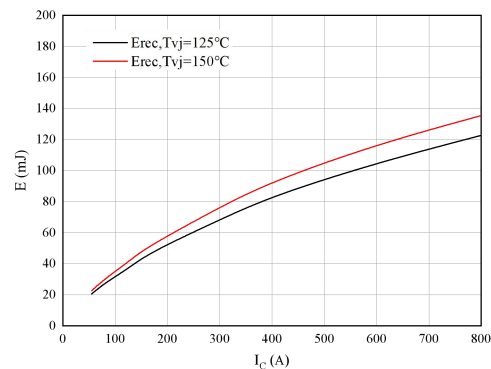


图 9. 开关损耗 二极管

Figure 9. Switching losses of Diode
 $R_{Gon}=1\Omega, V_{CE}=900V$

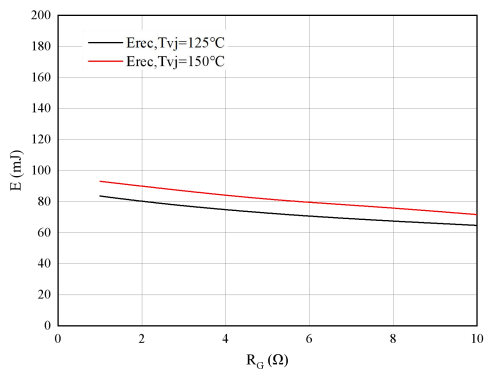


图 10. 开关损耗 二极管

Figure 10. Switching losses of Diode
 $I_F=400A, V_{CE}=900V$

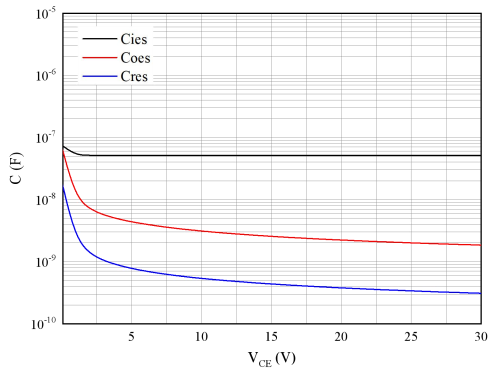
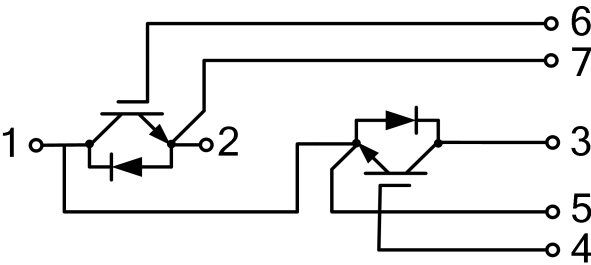


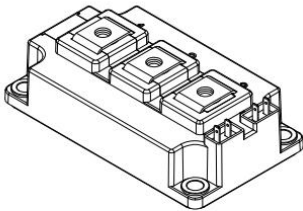
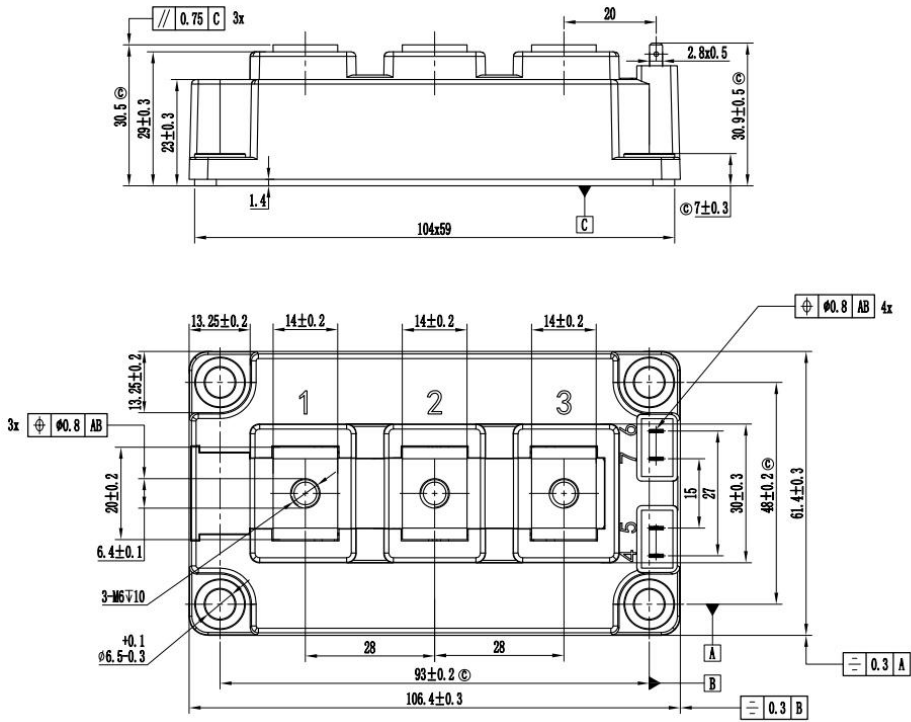
图 11. 电容特性

Figure 11. Capacitance characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines



注: 1. ① 尺寸为关键管控尺寸
2. 未标注公差按GB/T1804-m执行