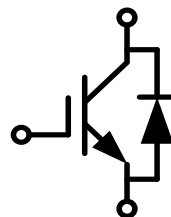


## IGBT Discrete with Anti-Parallel Diode

### 电气特性:

- 650V 沟槽栅/场终止工艺
- 低开关损耗
- 正温度系数



### 典型应用:

- 充电桩
- OBC
- UPS
- 逆变器



$V_{CES} = 650V$ ,  $I_{C\ nom} = 50A$  /  $I_{CRM} = 100A$

## 双极晶体管/IGBT

### 最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
集电极-发射极电压 Collector-Emitter voltage	$T_{vj} = 25^{\circ}C$	$V_{CES}$	650	V
连续集电极直流电流 Continuous DC collector current	$T_C = 100^{\circ}C$ , $T_{vj\ max} = 175^{\circ}C$	$I_{C\ nom}$	50	A
集电极重复峰值电流 Repetitive peak collector current	$t_p = 1\ ms$	$I_{CRM}$	100	A
栅电荷 Gate charge	$V_{GE} = -15V \dots +15V$	QG	0.50	$\mu C$
总功率损耗 Total power dissipation	$T_C = 25^{\circ}C$ , $T_{vj\ max} = 175^{\circ}C$	$P_{tot}$	275	W
栅极-发射极电压 Gate emitter voltage		$V_{GE}$	$\pm 20$	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	$V_{GE} = 15V$ , $I_C = 50A$ $V_{GE} = 15V$ , $I_C = 50A$ $V_{GE} = 15V$ , $I_C = 50A$	$T_{vj} = 25^{\circ}C$ $T_{vj} = 125^{\circ}C$ $T_{vj} = 150^{\circ}C$	$V_{CEsat}$	1.58 1.87 1.95	2.10	V

栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C=0.5\text{mA}, V_{GE}=V_{CE}$	$T_{vj}=25^\circ\text{C}$	$V_{GE(th)}$	4.2	5.0	5.8	
跨导 Transconductance	$V_{CE}=20\text{V}, I_C=50\text{A}$		$G_{fs}$		77		S
输入电容 Input capacitance	$f=1\text{MHz}, V_{CE}=25\text{V}, V_{GE}=0\text{V}$	$T_{vj}=25^\circ\text{C}$	$C_{ies}$		5.46		nF
反向传输电容 Reverse transfer capacitance			$C_{res}$		0.1		
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE}=650\text{V}, V_{GE}=0\text{V}$	$T_{vj}=25^\circ\text{C}$	$I_{CES}$			1	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE}=0\text{V}, V_{GE}=20\text{V}$	$T_{vj}=25^\circ\text{C}$	$I_{GES}$			200	nA
开通延迟时间 Turn-on delay time	$I_C=50\text{A}, V_{CE}=400\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$t_{d\ on}$		33		
		$T_{vj}=125^\circ\text{C}$			21		
		$T_{vj}=150^\circ\text{C}$			19		
上升时间 Rise time	$I_C=50\text{A}, V_{CE}=400\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$t_r$		75		
		$T_{vj}=125^\circ\text{C}$			67		
		$T_{vj}=150^\circ\text{C}$			65		
关断延迟时间 Turn-off delay time	$I_C=50\text{A}, V_{CE}=400\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$t_{d\ off}$		21		ns
		$T_{vj}=125^\circ\text{C}$			32		
		$T_{vj}=150^\circ\text{C}$			38		
下降时间 Fall time	$I_C=50\text{A}, V_{CE}=400\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$t_f$		41		
		$T_{vj}=125^\circ\text{C}$			62		
		$T_{vj}=150^\circ\text{C}$			62		
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	$I_C=50\text{A}, V_{CE}=400\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$E_{on}$		2.37		mJ
		$T_{vj}=125^\circ\text{C}$			2.88		
		$T_{vj}=150^\circ\text{C}$			3.10		
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	$I_C=50\text{A}, V_{CE}=400\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$E_{off}$		0.60		
		$T_{vj}=125^\circ\text{C}$			0.73		
		$T_{vj}=150^\circ\text{C}$			0.76		
结-外壳热阻 IGBT thermal resistance, junction			$R_{thJC}$		0.38		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		175	$^\circ\text{C}$

## 二极管/Diode

### 最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj}=25^\circ\text{C}$	$V_{RRM}$	650	V
连续正向直流电流 Continuous DC forward current	$T_C=100^\circ\text{C}, T_{vj\ max}=175^\circ\text{C}$	$I_F$	40	A
正向重复峰值电流 Repetitive peak forward current	$t_p=1\text{ms}$	$I_{FRM}$	100	A

## 特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=40A, V_{GE}=0V$ $I_F=40A, V_{GE}=0V$ $I_F=40A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$V_F$	1.33 1.20 1.17	1.9	V
反向恢复峰值电流 Peak reverse recovery current	$I_F=40A,$ $-di_F/dt=443A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$I_{RM}$	26 37 42		A
反向恢复电荷 Reverse Recovered charge	$I_F=40A,$ $-di_F/dt=443A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$Q_{rr}$	1.59 3.28 3.74		$\mu C$
反向恢复时间 Reverse Recovery Time	$I_F=40A,$ $-di_F/dt=443A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_{rr}$	134 191 194		ns
反向恢复损耗（每脉冲） Reverse recovered energy	$I_F=40A,$ $-di_F/dt=443A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$E_{rec}$	0.38 0.76 0.85		mJ
结-外壳热阻 Diode thermal resistance, junction			$R_{thJC}$	0.45		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40	175	$^{\circ}C$

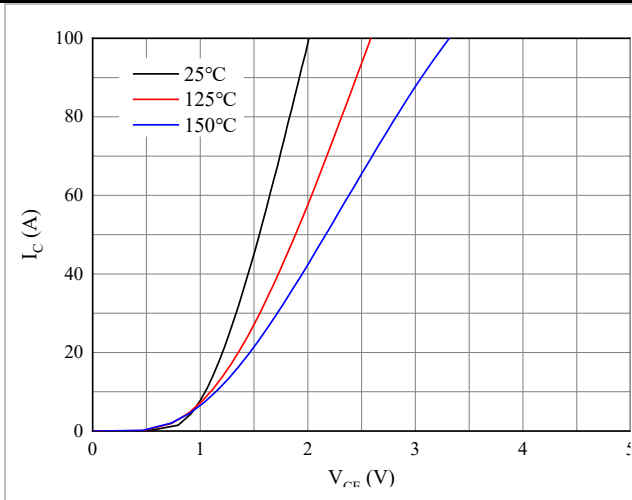


图 1. 典型输出特性 ( $V_{GE}=15V$ )  
Figure 1. Typical output characteristics ( $V_{GE}=15V$ )

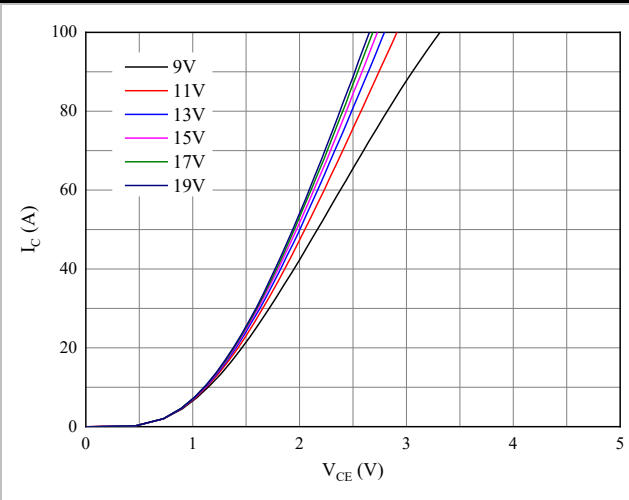


图 2. 典型输出特性 ( $T_{vj}=150^{\circ}C$ )  
Figure 2. Typical output characteristics ( $T_{vj}=150^{\circ}C$ )

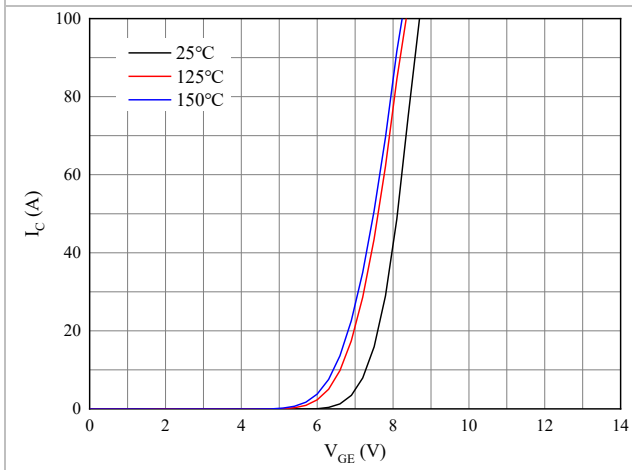


图 3. 典型传输特性 ( $V_{CE}=20V$ )  
Figure 3. Typical transfer characteristic ( $V_{CE}=20V$ )

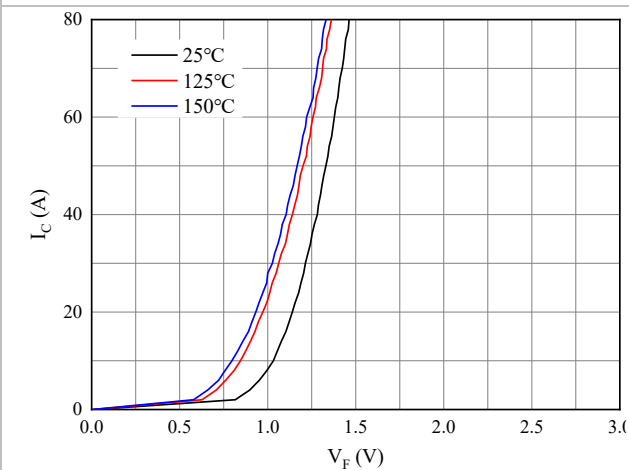


图 4. 正向偏压特性 二极管  
Figure 4. Forward characteristic of Diode

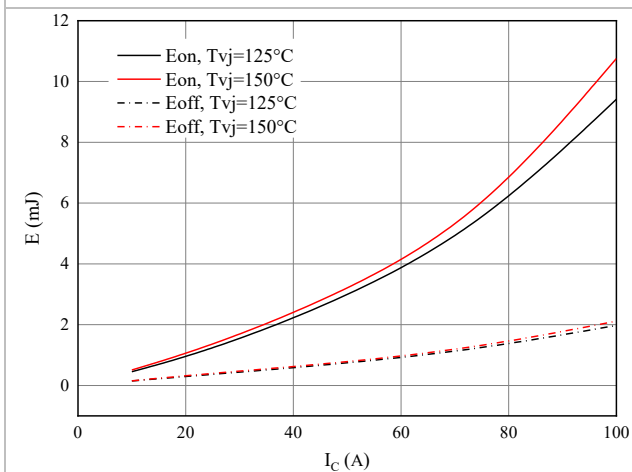


图 5. 开关损耗  
Figure 5. Switching losses of IGBT  
 $V_{GE}=\pm 15V, R_{Gon}=8\Omega, R_{Goff}=8\Omega, V_{CE}=400V$

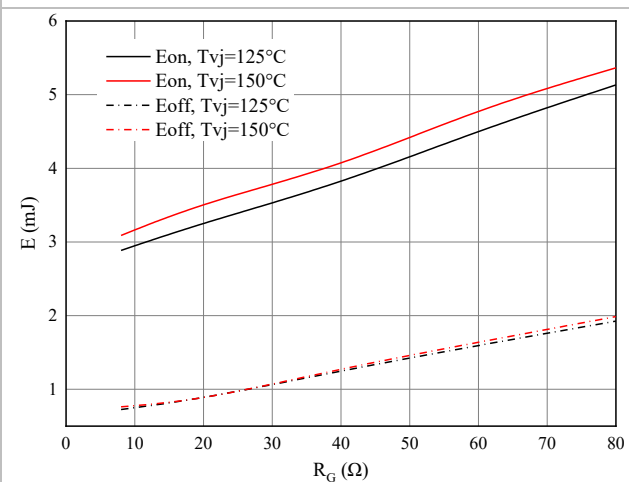


图 6. 开关损耗  
Figure 6. Switching losses of IGBT  
 $V_{GE}=\pm 15V, I_C=40A, V_{CE}=400V$

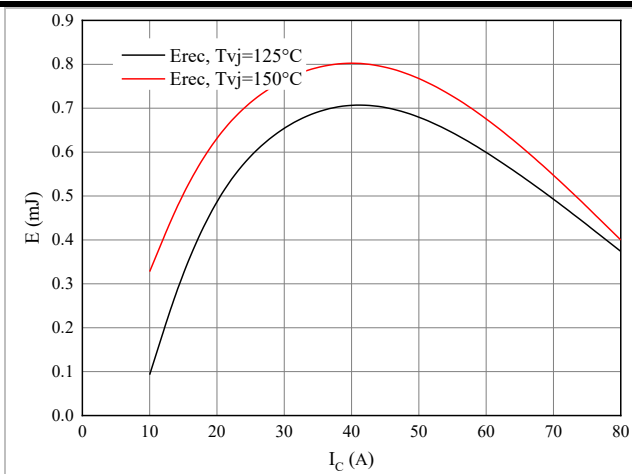


图 7. 开关损耗 二极管

Figure 7. Switching losses of Diode

$R_{gon}=8\Omega, V_{CE}=400\text{V}$

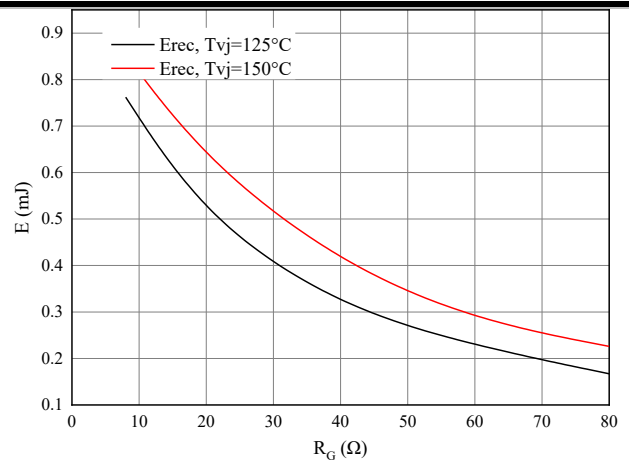


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode

$I_F=40\text{A}, V_{CE}=400\text{V}$

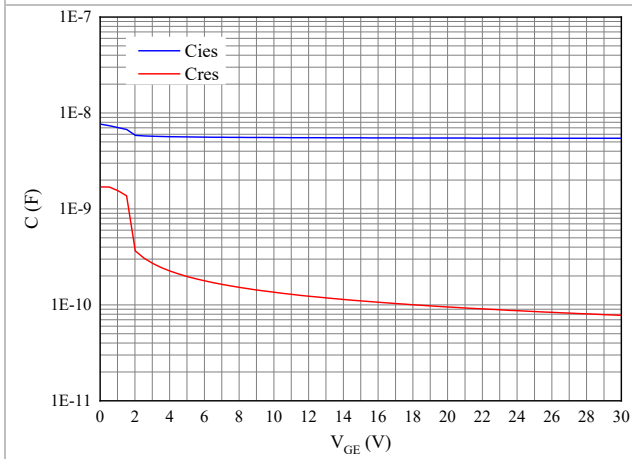
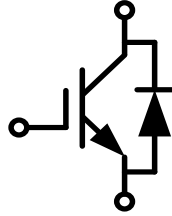


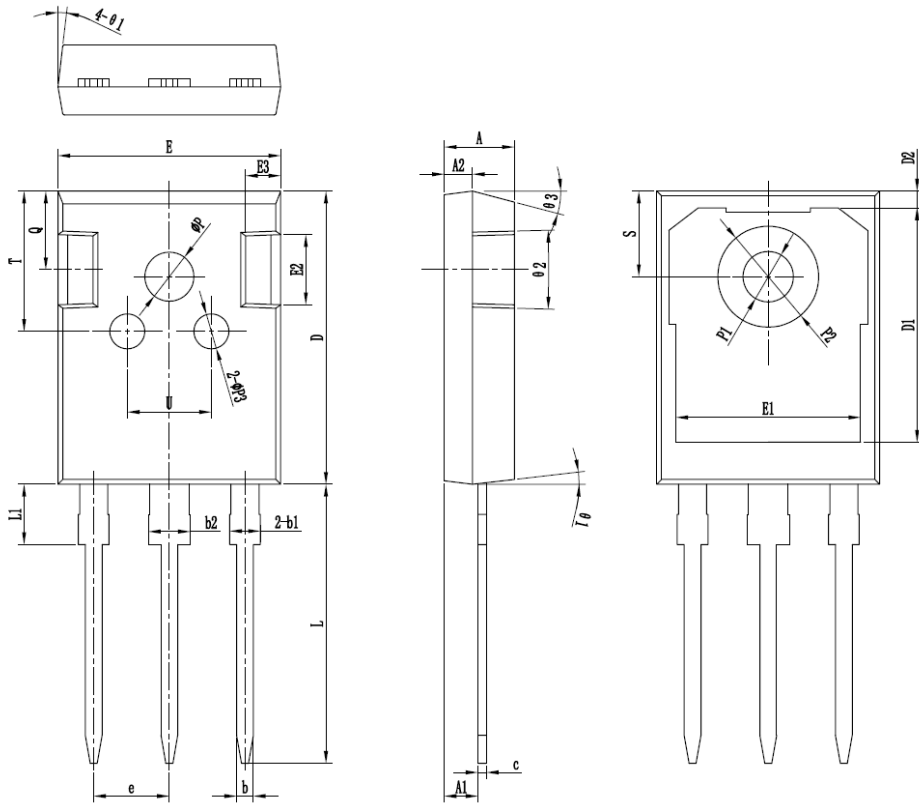
图 9. 电容特性

Figure 9. Capacitance characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines



符号	单位:mm		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.15	1.20	1.25
b1	1.95	2.10	2.25
b2	2.95	3.10	3.25
c	0.65	0.60	0.65
D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35
E	15.70	15.80	15.90
E1	13.10	13.25	13.40
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.40	5.44	5.48
L	19.80	19.92	20.10
L1	-	-	4.30
PP	3.70	3.80	3.90
PP1	3.50	3.60	3.70
PP2	7.00	7.20	7.40
PP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
Q	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
Ø1	5°	7°	9°
Ø2	1°	3°	5°
Ø3	13°	15°	17°

\*为关键管控尺寸