

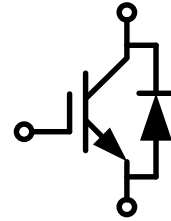
IGBT Discrete with Anti-Parallel Diode

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
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}	± 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}	1.50 1.87 1.95	2.10	V
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C = 0.5mA$, $V_{GE} = V_{CE}$	$T_{vj} = 25^{\circ}C$	$V_{GE(th)}$	4.2	5.0	5.8

跨导 Transconductance	$V_{CE}=20V, I_C=50A$	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	$V_{CE}=650V, V_{GE}=0\text{ V}$	$T_{vj}=25^\circ\text{C}$	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	$I_C=50A, V_{CE}=400\text{ V}$ $V_{GE}=\pm 15\text{ V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$t_{d\ on}$		43	
		$T_{vj}=125^\circ\text{C}$			20	
		$T_{vj}=150^\circ\text{C}$			19	
上升时间 Rise time	$I_C=50A, V_{CE}=400\text{ V}$ $V_{GE}=\pm 15\text{ V}, R_G=8\Omega$ (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	$I_C=50A, V_{CE}=400\text{ V}$ $V_{GE}=\pm 15\text{ V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$t_{d\ off}$		153	ns
		$T_{vj}=125^\circ\text{C}$			141	
		$T_{vj}=150^\circ\text{C}$			145	
下降时间 Fall time	$I_C=50A, V_{CE}=400\text{ V}$ $V_{GE}=\pm 15\text{ V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	t_f		57	
		$T_{vj}=125^\circ\text{C}$			65	
		$T_{vj}=150^\circ\text{C}$			66	
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	$I_C=50A, V_{CE}=400\text{ V}$ $V_{GE}=\pm 15\text{ V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	E_{on}		1.86	mJ
		$T_{vj}=125^\circ\text{C}$			1.86	
		$T_{vj}=150^\circ\text{C}$			1.86	
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	$I_C=50A, V_{CE}=400\text{ V}$ $V_{GE}=\pm 15\text{ V}, R_G=8\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	E_{off}		0.64	
		$T_{vj}=125^\circ\text{C}$			0.67	
		$T_{vj}=150^\circ\text{C}$			0.71	
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	50	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	$I_F=50A, V_{GE}=0V$ $I_F=50A, V_{GE}=0V$ $I_F=50A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	V_F	1.33 1.20 1.17	1.9	V
反向恢复峰值电流 Peak reverse recovery current	$I_F=50A,$ $-di_F/dt=387A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	I_{RM}	26 37 42		A
反向恢复电荷 Reverse Recovered charge	$I_F=50A,$ $-di_F/dt=387A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	Q_{rr}	2.12 4.65 5.66		μC
反向恢复时间 Reverse Recovery Time	$I_F=50A,$ $-di_F/dt=387A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	t_{rr}	164 231 247		ns
反向恢复损耗（每脉冲） Reverse recovered energy	$I_F=50A,$ $-di_F/dt=387A/\mu s(T_{vj}=150^{\circ}C)$ $V_R=400V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	E_{rec}	0.65 0.88 0.95		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	$^{\circ}C$

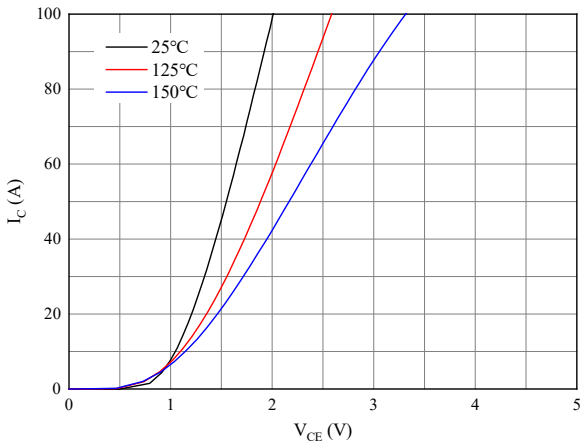


图 1. 典型输出特性 ($V_{GE}=15V$)

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

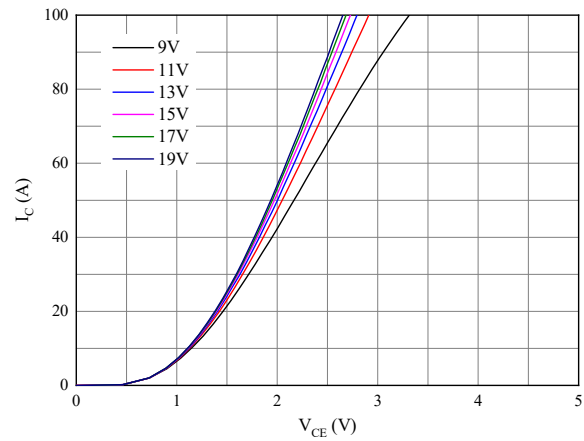


图 2. 典型输出特性 ($T_{vj}=150^{\circ}C$)

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

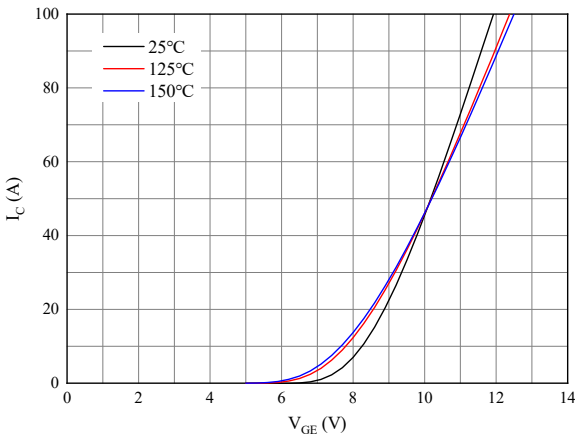


图 3. 典型传输特性 ($V_{CE}=20V$)

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

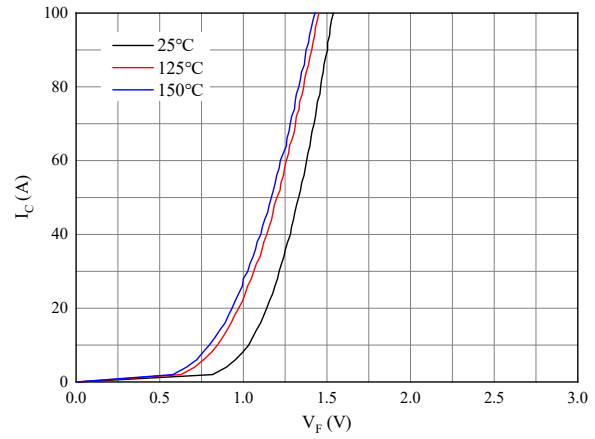


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

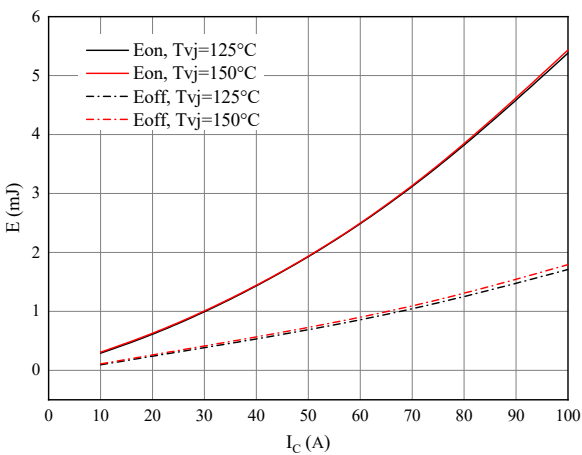


图 5. 开关损耗

Figure 5. Switching losses of IGBT

$V_{GE}=\pm 15V, R_{Gon}=8\Omega, R_{Goff}=8\Omega, V_{CE}=400V$

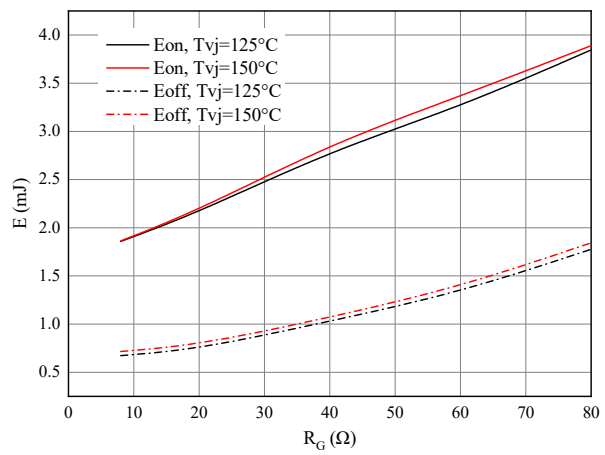


图 6. 开关损耗

Figure 6. Switching losses of IGBT

$V_{GE}=\pm 15V, I_C=50A, V_{CE}=400V$

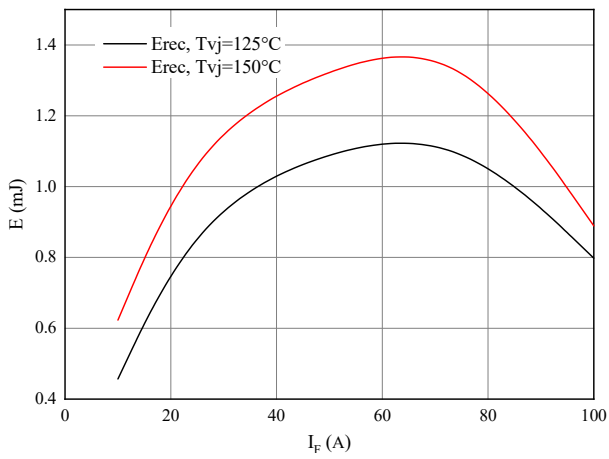


图 7. 开关损耗 二极管

Figure 7. Switching losses of Diode

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

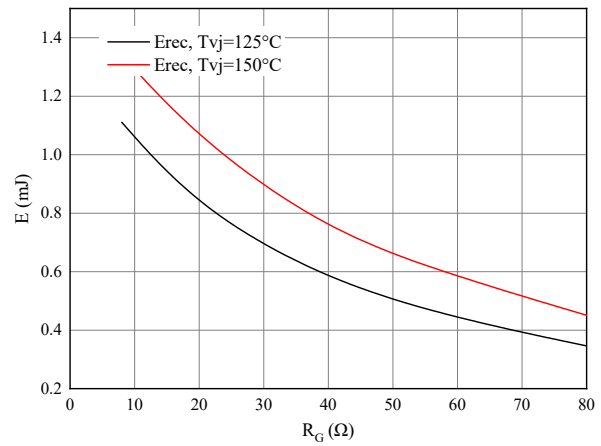


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode

$I_F=50\text{A}$, $V_{CE}=400\text{V}$

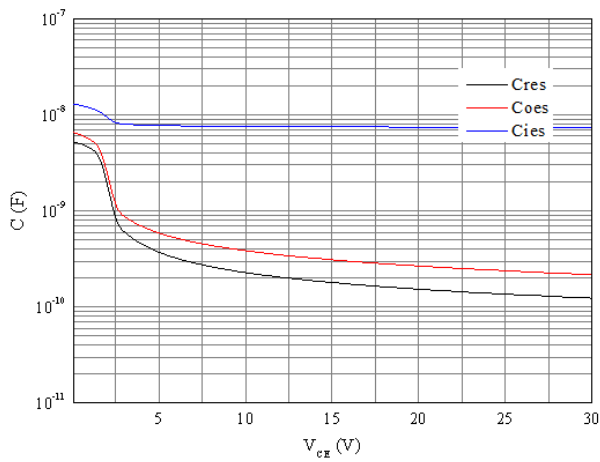
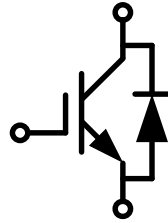


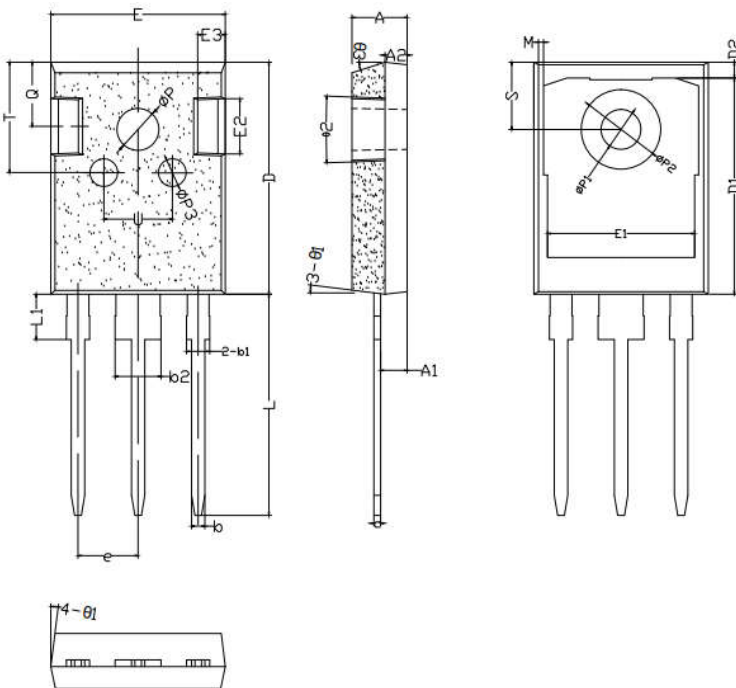
图 9. 电容特性

Figure 9. Capacitance characteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines



SYMBOL	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	0.55	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
*ΦP	3.70	3.80	3.90
*ΦP1	3.50	3.60	3.70
ΦP2	7.00	7.20	7.40
ΦP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
*S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°