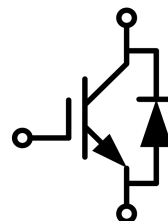


IGBT Discrete with Anti-Parallel Diode

电气特性:

- 1200V 沟槽栅/场终止工艺
1200V trench gate/field termination process
- 低开关损耗
Low switching losses
- Vcesat 正温度系数
Vcesat has a positive temperature coefficient



典型应用:

- 光伏逆变器
Solar Inverter
- 焊机
Welding Machine
- 不间断电源
Uninterruptible power supplies



关键性能和程序参数 / Key Performance and Package Parameters

Type	V _{CE}	I _C	V _{CEsat} , T _{vj} =25°C	T _{vjmax}	Package
SD75R12I6U	1200V	75A	2.11V	175°C	TO-247PLUS-3L

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 _{CE}	1200	V
栅极-发射电压 Gate to Emitter Voltage		V _{GE}	±20	V
瞬态栅极-发射电压 Transient Gate to Emitter Voltage	t _p ≤ 0.5μs, D < 0.001		±30	V
集电极电流 collector current	T _c =25°C T _c =100°C	I _C	150 75	A
脉冲集电极电流 Pulsed Collector Current	Pulse width limited by max junction temperature	I _{pulse}	300	A

Changes of this product data sheet are reserved.
Edited by Semi-Future Technologies, Edition 1.2

二极管正向电流 Diode Forward Current	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	I_F	150 75	
总功率损耗 Power dissipation	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	P_{tot}	555 280	W
工作结温 Operating Junction Temperature		T_J	-55 to +175	$^\circ\text{C}$
储存温度范围 Storage Temperature Range		T_{stg}	-55 to +150	$^\circ\text{C}$
结-环境热阻 Thermal resistance junction - ambient		$R_{th(j-a)}$	40	K/W

IGBT 特性/IGBT Characteristic

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	

静态特性/Static Characteristic

集电极-发射极击穿电压 Collector-emitter breakdown voltage	$V_{GE} = 0\text{V}, I_C = 0.25\text{mA}$	$V_{(BR)CES}$	1200			V	
集电极-发射极饱和电压 Collector-Emitter saturation voltage	$V_{GE}=15\text{V}, I_C=75\text{A}$ $V_{GE}=15\text{V}, I_C=75\text{A}$	$T_{vj}=25^\circ\text{C}$ $T_{vj}=175^\circ\text{C}$	V_{CEsat}	2.11 3.03	2.60	V	
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C=2.6\text{mA}, V_{GE}=V_{CE}$	$T_{vj}=25^\circ\text{C}$	$V_{GE(th)}$	5.0	5.6	6.5	V
跨导 Transconductance	$V_{CE}=20\text{V}, I_C=75\text{A}$		G_{fs}	98.8		S	
门极电荷 Gate charge	$I_C = 75\text{A}, V_{GE} = 15\text{V},$ $V_{CE} = 960\text{V}$	$T_{vj}=25^\circ\text{C}$	Q_G	0.77		μC	
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}		450	μA	
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	

动态特性/Dynamic Characteristic

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}	7.72		nF
输出电容 Output capacitance			C_{oes}	0.28		
反向传输电容 Reverse transfer capacitance			C_{res}	0.13		

开关特性/ Switching Characteristic

开通延迟时间 Turn-on delay time	$I_C=75\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=10\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ\text{C}$	$t_{d\ on}$	51		ns
上升时间 Rise time			t_r	193		

关断延迟时间 Turn-off delay time		$t_{d\ off}$		180		mJ
下降时间 Fall time		t_f		98		
开通损耗能量（每脉冲） Turn-on energy loss per pulse		E_{on}		9.5		
关断损耗能量（每脉冲） Turn-off energy loss per pulse		E_{off}		2.7		
总损耗能量 Total switching energy		E_{tot}		12.2		
开通延迟时间 Turn-on delay time		$t_{d\ on}$		40		
上升时间 Rise time	t_r		171			
关断延迟时间 Turn-off delay time	$t_{d\ off}$		202			
下降时间 Fall time	t_f		119			
开通损耗能量（每脉冲） Turn-on energy loss per pulse	E_{on}		14.6			
关断损耗能量（每脉冲） Turn-off energy loss per pulse	E_{off}		3.5			
总损耗能量 Total switching energy	E_{tot}		18.1			
IGBT 热阻, 结-壳 IGBT thermal resistance, junction - case		$R_{th(j-c)}$		0.27		K/W

二极管特性/Diode Characteristic

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	

静态特性/Static Characteristic

正向电压 Forward voltage	$I_F=75A$ $I_F=75A$	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	V_F		1.93 1.67	2.40	V
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开关特性/ Switching Characteristic

反向恢复峰值电流 Peak reverse recovery current	$I_F=75A, -di_F/dt=320A/\mu s$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^\circ C$	I_{RM}		18		A
反向恢复电荷 Reverse Recovered charge			Q_{rr}		4.21		μC
反向恢复时间 Reverse Recovery Time			t_{rr}		444		ns

反向恢复损耗（每脉冲） Reverse recovered energy		E_{rec}		1.7		mJ
反向恢复峰值电流 Peak reverse recovery current	$I_F=75A, -di_F/dt=320A/\mu s$ $V_R=600V, V_{GE}=-15V$ $T_{vj}=175^\circ C$	I_{RM}		43		A
反向恢复电荷 Reverse Recovered charge		Q_{rr}		15.36		μC
反向恢复时间 Reverse Recovery Time		t_{rr}		767		ns
反向恢复损耗（每脉冲） Reverse recovered energy		E_{rec}		6.2		mJ
二极管热阻，结-壳 Diode thermal resistance, junction - case		$R_{th(j-c)}$		0.28		K/W

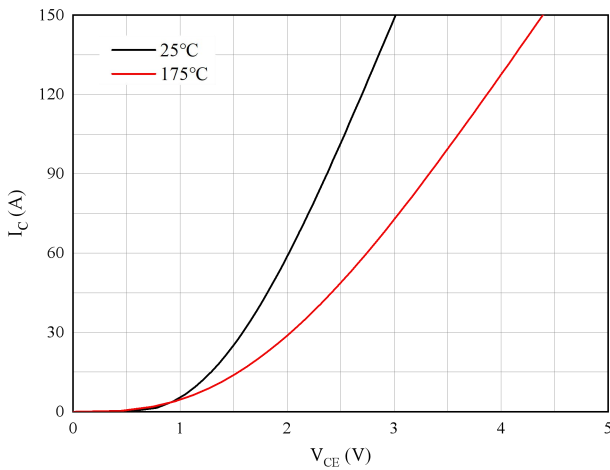


图 1. 典型输出特性 ($V_{GE}=15V$)
Figure 1. Typical output characteristics ($V_{GE}=15V$)

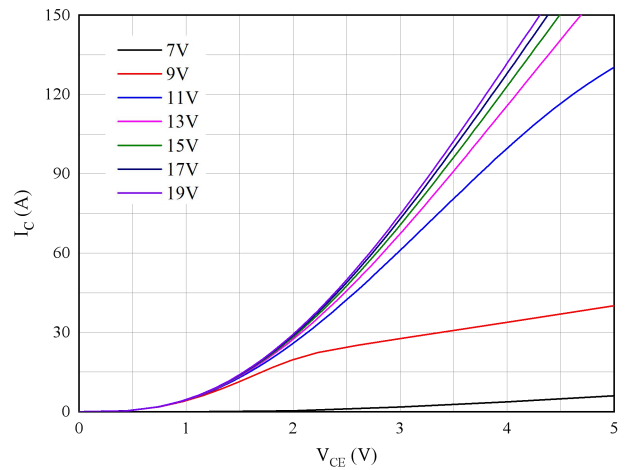


图 2. 典型输出特性 ($T_{vj}=175^{\circ}C$)
Figure 2. Typical output characteristics ($T_{vj}=175^{\circ}C$)

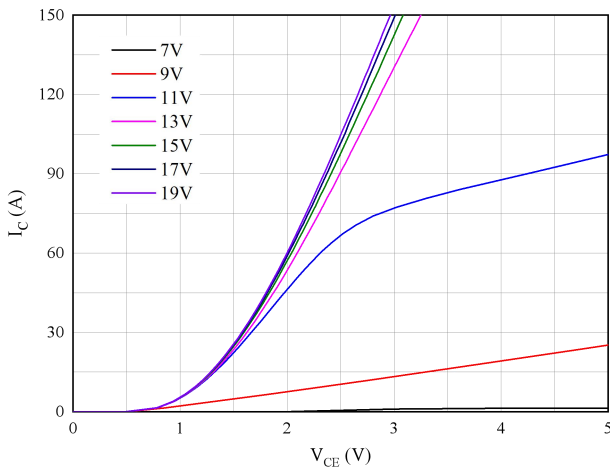


图 3. 典型输出特性 ($T_{vj}=25^{\circ}C$)
Figure 3. Typical output characteristics ($T_{vj}=25^{\circ}C$)

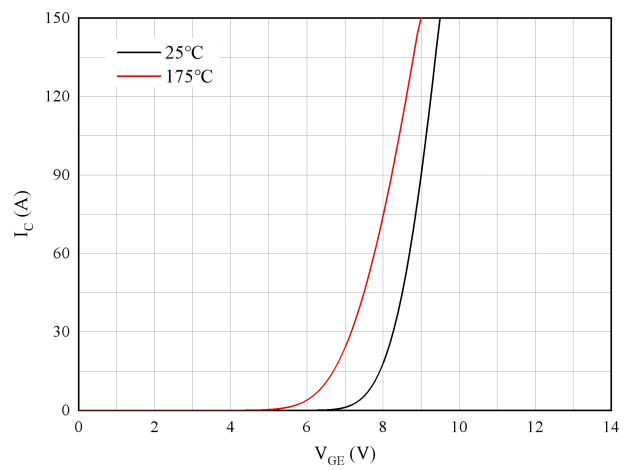


图 4. 典型传输特性 ($V_{CE}=20V$)
Figure 4. Typical transfer characteristic ($V_{CE}=20V$)

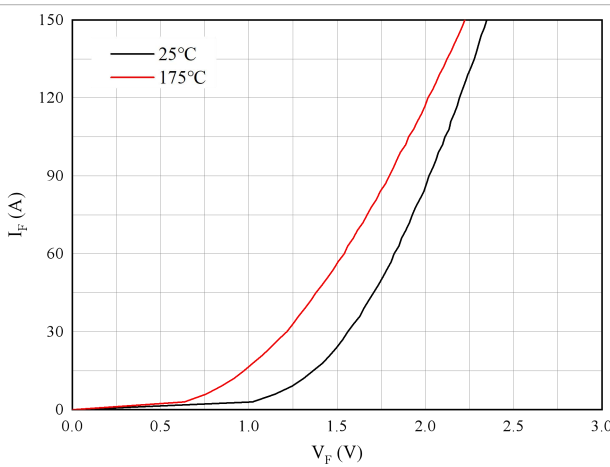


图 5. 正向偏压特性 二极管
Figure 5. Forward characteristic of Diode

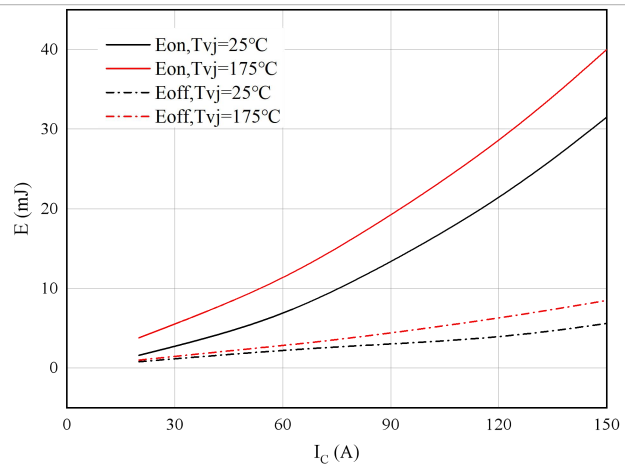


图 6. 开关损耗
Figure 6. Switching losses of IGBT
 $V_{GE}=\pm 15V, R_{Gon}=10\Omega, R_{Goff}=10\Omega, V_{CE}=600V$

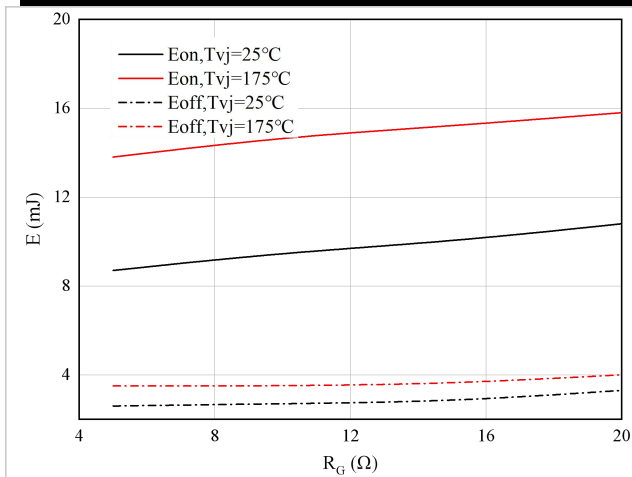


图 7. 开关损耗

Figure 7. Switching losses of IGBT

VGE=±15V, IC=75A, VCE=600V

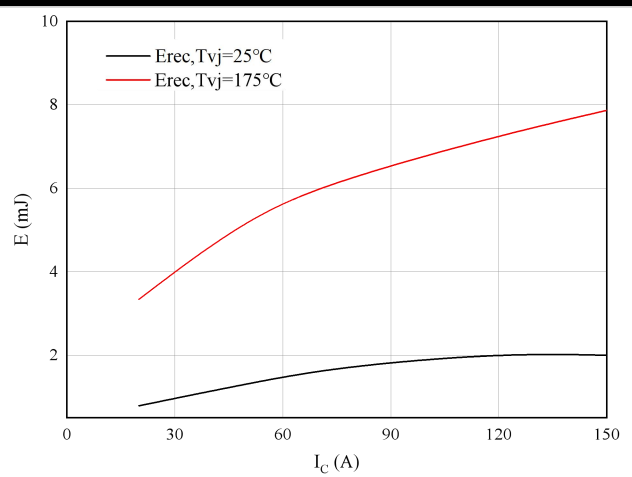


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode

Rgon=10Ω, VCE=600V

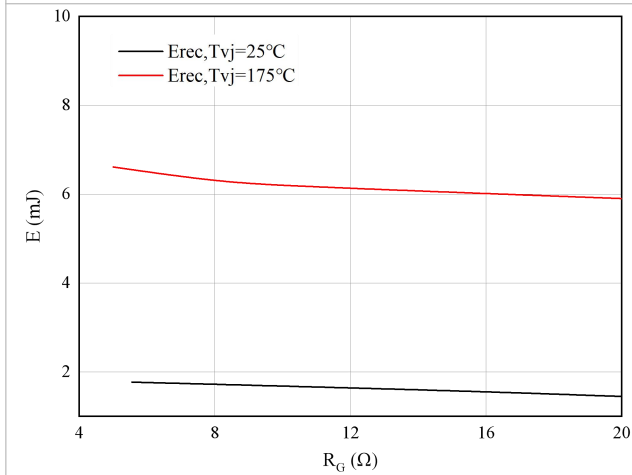


图 9. 开关损耗 二极管

Figure 9. Switching losses of Diode

IF=75A, VCE=600V

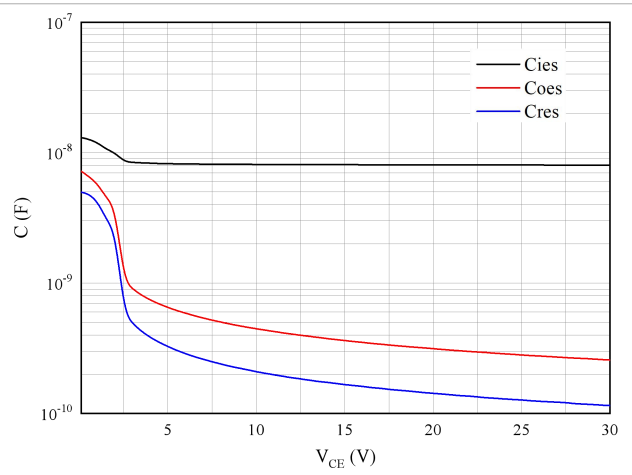


图 10. 电容特性

Figure 10. Capacitance characteristic

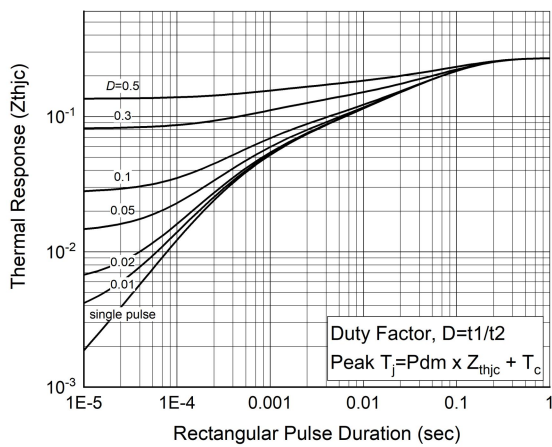


图 11. 瞬态热阻抗 IGBT

Figure 11. Transient thermal impedance IGBT,

$$Z_{thjC}=f(t)$$

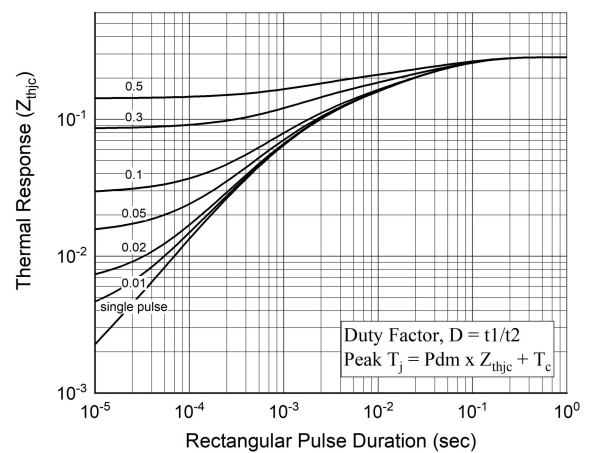
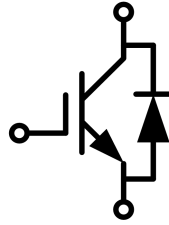


图 12. 瞬态热阻抗 FRD

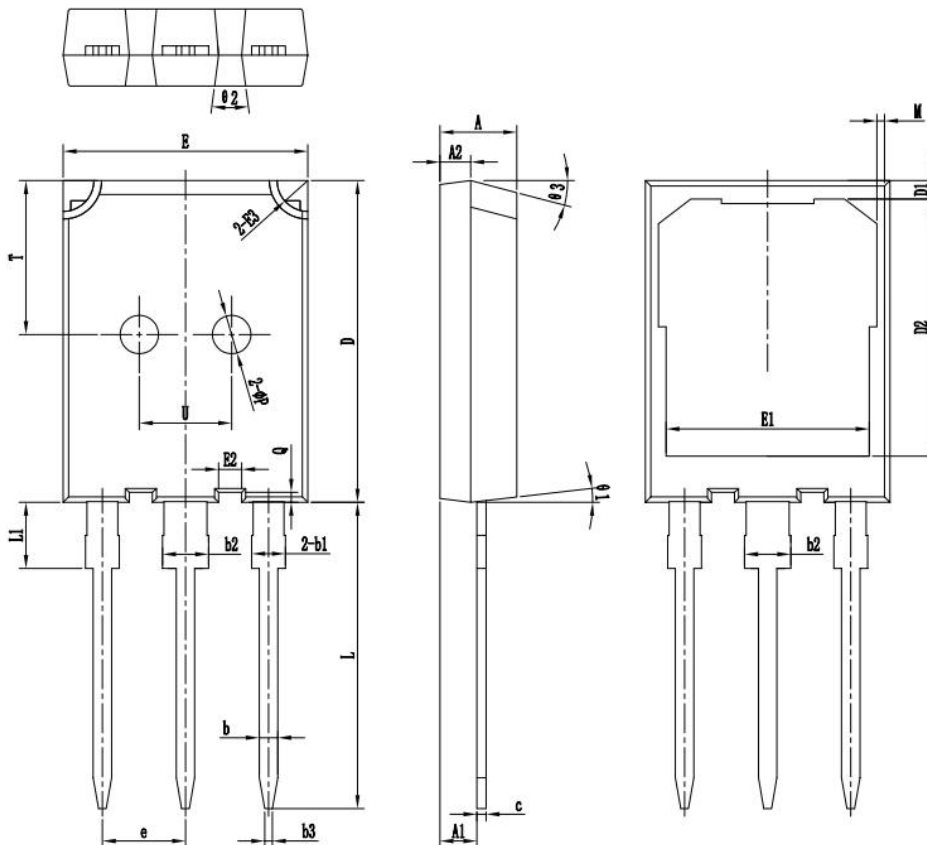
Figure 12. Transient thermal impedance FRD,

$$Z_{thjC}=f(t)$$

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
b3	0.45	0.60	0.75
⌀c	0.55	0.60	0.68
⌀D	20.90	21.00	21.10
D1	1.00	1.20	1.40
D2	15.25	16.55	16.85
⌀E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	1.25	1.45	1.65
E3	1.80	2.00	2.20
⌀e	5.40	5.44	5.48
⌀L	19.80	19.92	20.10
⌀L1	-	-	4.30
⌀P	2.30	2.50	2.70
Q	0.50	0.68	0.80
T	9.80	10.00	10.20
U	5.80	6.00	6.20
θ1	5°	7°	9°
θ2	13°	16°	19°
θ3	13°	15°	17°

*为关键管控尺寸