DONGGUAN NANJING ELECTRONICS LTD.,

TO-247-3 Plastic-Encapsulate IGBT

NJ75R12I6U IGBT Discrete with Anti-Parallel Diode

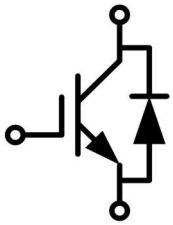
电气特性 / Features and Benefits:

- 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



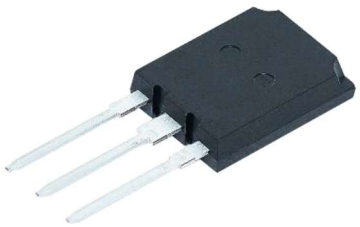
典型应用 / Applications:

- 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	VCEsat, T_{vj}=25°C	T_{vjmax}	Package
NJ75R12I6U	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	Tc=25°C Tc=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

二极管正向电流 Diode Forward Current	Tc=25°C Tc=100°C	I_F	150 75	
总功率损耗 Power dissipation	T_C=25℃ T_C=100℃	P_{tot}	555 280	W
工作结温 Operating Junction Temperature		T_J	-55 to +175	°C
储存温度范围 Storage Temperature Range		T_{stg}	-55 to +150	°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	VGE = 0V, I_C = 0.25mA		$V_{(BR)CES}$	1200			V
集电极-发射极饱和电压 Collector-Emitter saturation voltage	V_{GE}=15V, I_C=75A V_{GE}=15V, I_C=75A	T_{vj}=25°C T_{vj}=175°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=2.6mA, V_{GE}= V_{CE}	T_{vj}=25°C	$V_{GE(th)}$	5.0	5.6	6.5	V
跨导 Transconductance	V_{CE}=20V，I_C=75A		G_{fs}		98.8		S
门极电荷 Gate charge	I_C = 75A, V_{GE} = 15 V, V_{CE} =960 V	T_{vj}=25°C	Q_G		0.77		μC
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE}=1200V , V_{GE}= 0 V	T_{vj}=25°C	I_{CES}			450	μA
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}			100	nA
动态特性/Dynamic Characteristic							
输入电容 Input capacitance	f=1 MHz, V_{CE}=25 V, V_{GE}=0 V	T_{vj}=25°C	Cies		7.72		nF
输出电容 Output capacitance			Coes		0.28		
反向传输电容 Reverse transfer capacitance			Cres		0.13		
开关特性/ Switching Characteristic							
开通延迟时间 Turn-on delay time	I_C=75A, V_{CE}=600 V V_{GE}=±15 V, R_G=10Ω (电感负载) / (inductive load)	T_{vj}=25°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		
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		mJ
总损耗能量 Total switching energy			E_{tot}		12.2		
开通延迟时间 Turn-on delay time	I_C=75A, V_{CE}=600 V V_{GE}=±15 V, R_G=10Ω (电感负载) / (inductive load)	T_{vj}=175°C	td_{on}		40		
上升时间 Rise time			t_r		171		
关断延迟时间 Turn-off delay time			td_{off}		202		
下降时间 Fall time			t_f		119		mJ
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			Eoff		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°C T_{vj}=175°C	V_F		1.93 1.67	2.40	V
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/μs V_R=600V, V_{GE}=-15V	T_{vj}=25°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

Typical Characteristics

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/μs V_R=600V, V_{GE}=-15V	T_{vj}=175°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

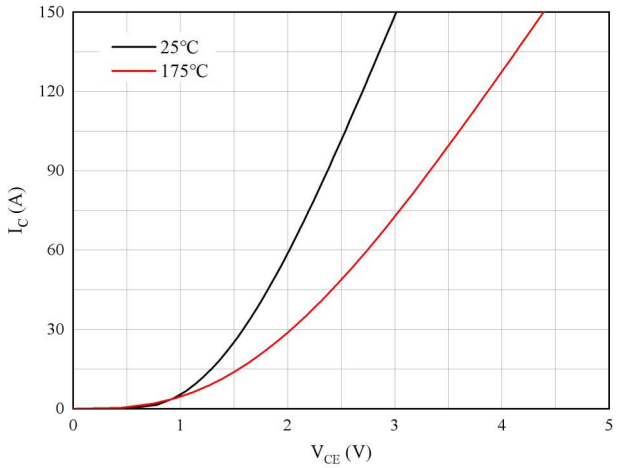


图 1. 典型输出特性 (V_{GE}=15V)

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

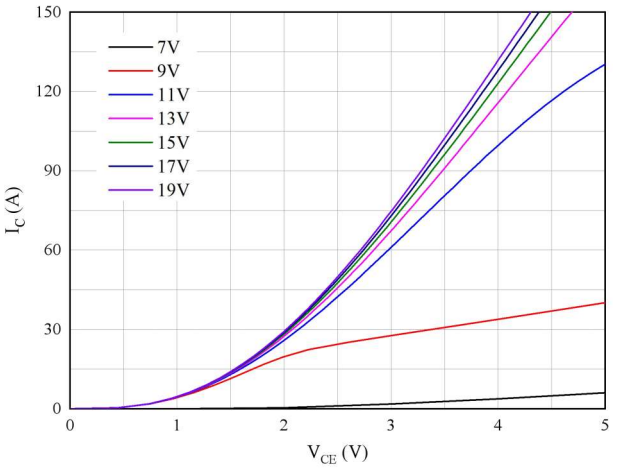


图 2. 典型输出特性 (T_{vj}=175℃)

Figure 2. Typical output characteristics (T_{vj}=175℃)

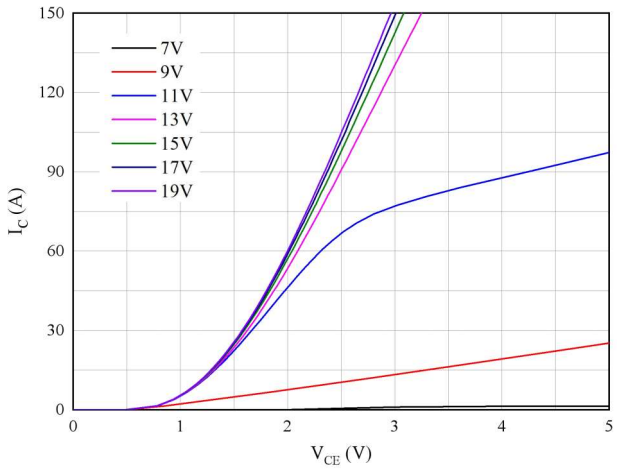


图 3. 典型输出特性 (T_{vj}=25℃)

Figure 3. Typical output characteristics (T_{vj}=25℃)

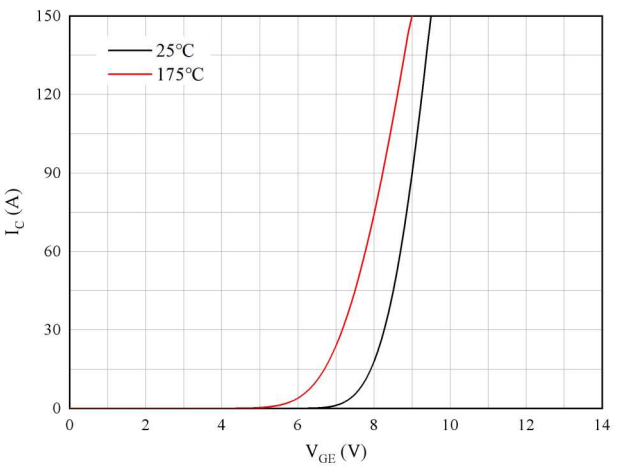


图 4. 典型传输特性(V_{CE}=20V)

Figure 4. Typical transfer characteristic(V_{CE}=20V)

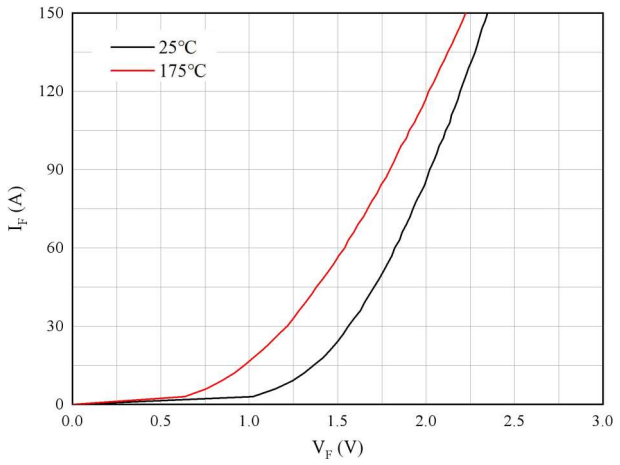


图 5. 正向偏压特性 二极管

Figure 5. Forward characteristic of Diode

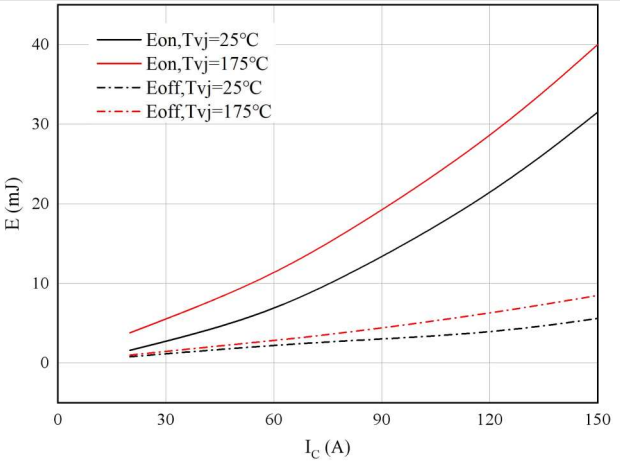


图 6. 开关损耗

Figure 6. Switching losses of IGBT

VGE=±15V, RGon=10Ω, Rgoff=10Ω, VCE=600V

Typical Characteristics

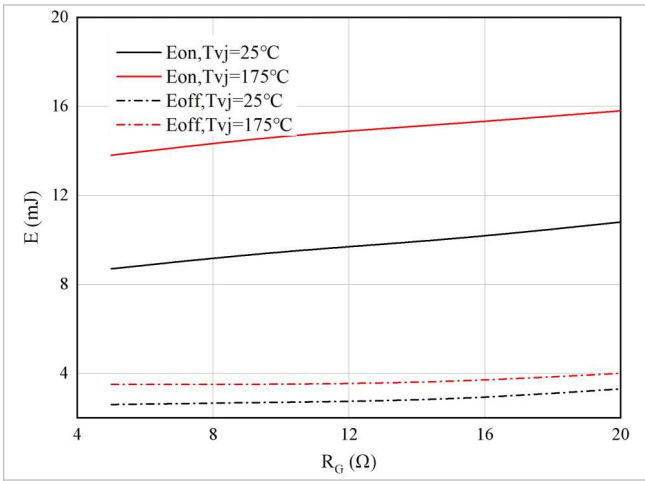


图 7. 开关损耗

Figure 7. Switching losses of IGBT

VGE=±15V, IC=75A, VCE=600V

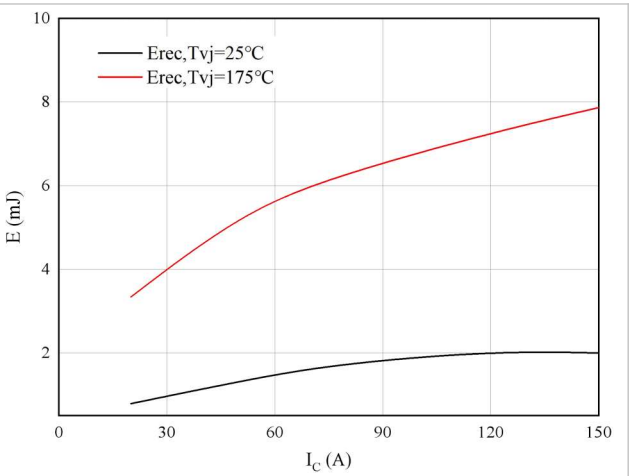


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode

Rgon=10Ω, VCE=600V

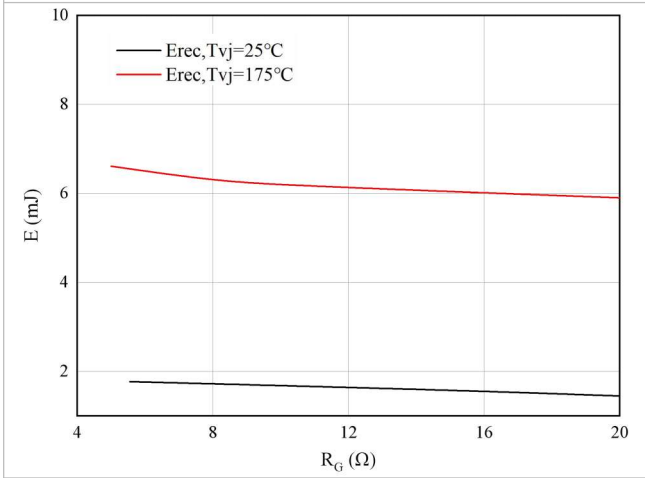


图 9. 开关损耗 二极管

Figure 9. Switching losses of Diode

IF=75A, VCE=600V

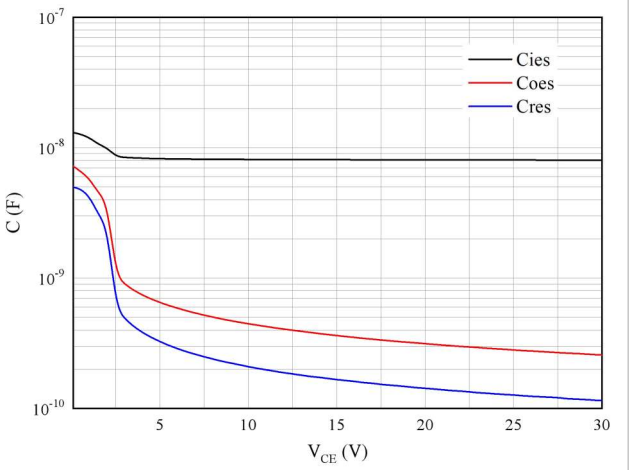


图 10. 电容特性

Figure 10. Capacitance characteristic

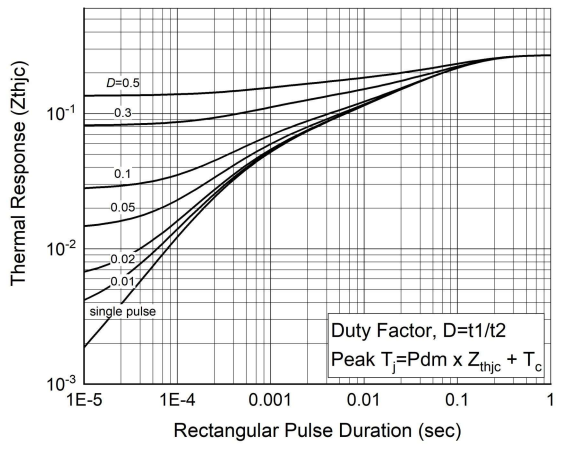


图 11. 瞬态热阻抗 IGBT

Figure 11. Transient thermal impedance IGBT, Z_{thJC}=f(t)

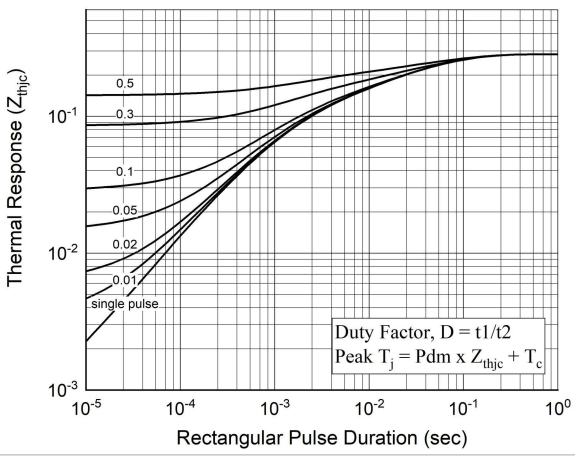
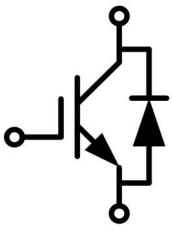


图 12. 瞬态热阻抗 FRD

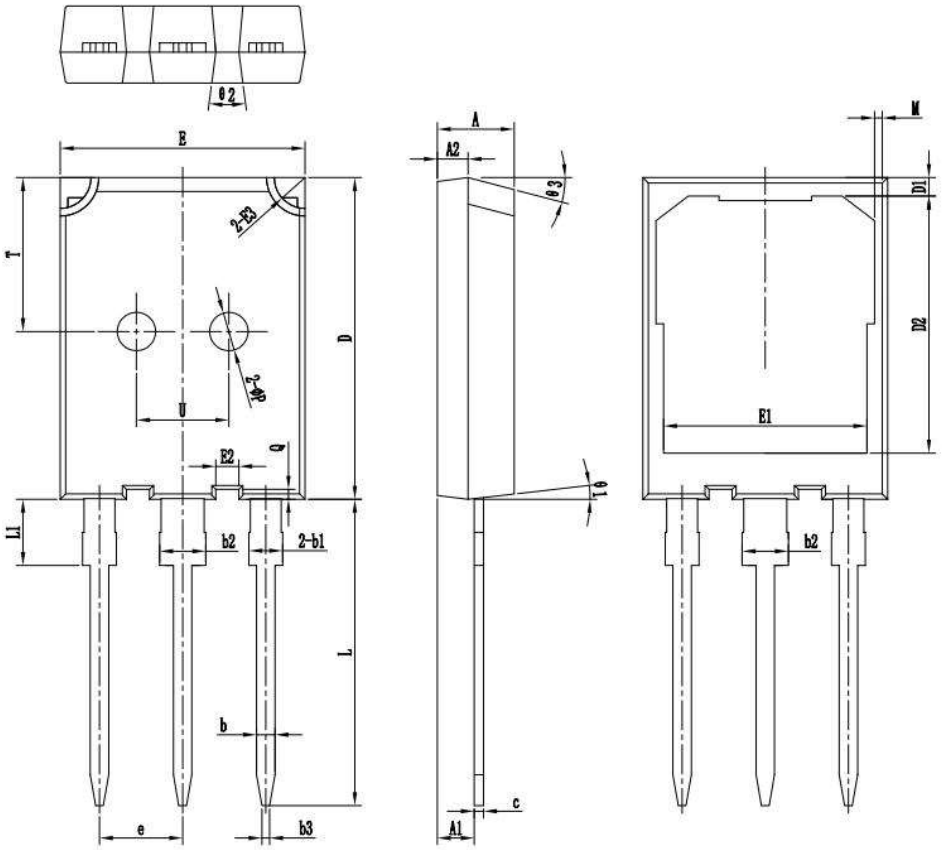
Figure 12. Transient thermal impedance FRD, Z_{thJC}=f(t)

Package Outline Dimensions

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
φP	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