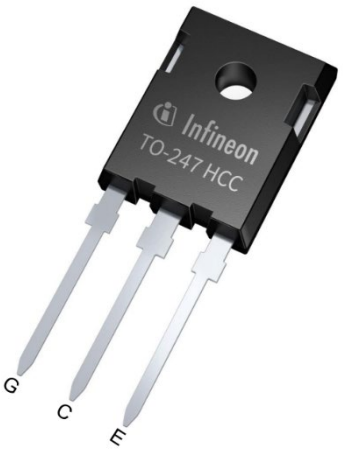
Final datasheet

英飞凌高速、低饱和电压 750 V TRENCHSTOP™ IGBT 7 技术，与软恢复和快速恢复的发射极控制 7 二极管共同封装



Lead-free
Green
Halogen-free
RoHS

特性

- V_{CE} = 750 V
- I_C = 75 A
- 低开关损耗
- 极低的集电极-发射极饱和电压 V_{CEsat}
- 带软恢复和快速恢复的反并联二极管
- 平滑切换
- 防潮性
- 针对硬开关、两电平和三电平拓扑进行了优化
- 完整的产品品类和 PSpice 模型： http://www.infineon.com/igbt/

潜在应用

- 工业级不间断电源（UPS）
- 电动汽车充电桩
- 组串式逆变器
- 储能系统（ESS）

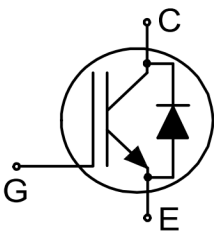
产品验证

- 符合 JEDEC47/20/22 相关测试的工业应用要求

描述

封装引脚定义：

- 引脚 G - 栅极
- 引脚 C & 背面 - 集电极
- 引脚 E - 发射极



Type	Package	Marking
IKWH75N75EH7	PG-TO247-3-U04	K75GEH7

本数据手册的原文使用英文撰写。为方便起见，英飞凌提供了译文；由于翻译过程中可能使用了自动化工具，英飞凌不保证译文的准确性。为确认准确性，请务必访问 infineon.com 参考最新的英文版本（控制文档）。

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1 封装

表 1 特征值

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Internal emitter inductance measured 5 mm (0.197 in.) from case	L_E			13		nH
Storage temperature	T_{stg}		-55		150	°C
Soldering temperature	T_{sold}	wave soldering 1.6 mm (0.063 in.) from case for 10 s			260	°C
Mounting torque	M	M3 screw, Maximum of mounting processes: 3			0.6	Nm
Thermal resistance, junction-ambient	$R_{th(j-a)}$				40	K/W
IGBT thermal resistance, junction-case	$R_{th(j-c)}$			0.34	0.44	K/W
Diode thermal resistance, junction-case	$R_{th(j-c)}$			0.45	0.58	K/W

2 IGBT

表 2 最大额定值

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CE}	$T_{vj} \geq 25$ °C		750	V
DC collector current, limited by T_{vjmax}	I_C	limited by bondwire	$T_c = 25$ °C	80	A
			$T_c = 100$ °C	80	
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpulse}			300	A
Turn-off safe operating area		$V_{CE} \leq 750$ V, $t_p \leq 1$ µs, $T_{vj} \leq 175$ °C		300	A
Gate-emitter voltage	V_{GE}			±20	V
Transient gate-emitter voltage	V_{GE}	$t_p \leq 10$ µs, $D < 0.01$		±30	V
Power dissipation	P_{tot}		$T_c = 25$ °C	341	W
			$T_c = 100$ °C	170	

表 3　　特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	V_{CEsat}	I_C = 75 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.45	1.75	V
			T_{vj} = 175 °C		1.75		
Gate-emitter threshold voltage	V_{GEth}	I_C = 0.66 mA, V_{CE} = V_{GE}		3.2	4	4.8	V
Zero gate-voltage collector current	I_{CES}	V_{CE} = 750 V, V_{GE} = 0 V	T_{vj} = 25 °C			25	µA
			T_{vj} = 175 °C		2600		
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V				100	nA
Transconductance	g_{fs}	I_C = 75 A, V_{CE} = 20 V			85		S
Input capacitance	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz			3930		pF
Output capacitance	C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz			115		pF
Reverse transfer capacitance	C_{res}	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz			15		pF
Gate charge	Q_G	V_{CC} = 600 V, I_C = 75 A, V_{GE} = 15 V			155		nC
Turn-on delay time	$t_{d(on)}$	V_{CC} = 400 V, V_{GE} = 0/15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 10 Ω	T_{vj} = 25 °C, I_C = 75 A		25		ns
			T_{vj} = 175 °C, I_C = 75 A		24		
Rise time (inductive load)	t_r	V_{CC} = 400 V, V_{GE} = 0/15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 10 Ω	T_{vj} = 25 °C, I_C = 75 A		28		ns
			T_{vj} = 175 °C, I_C = 75 A		29		
Turn-off delay time	$t_{d(off)}$	V_{CC} = 400 V, V_{GE} = 0/15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 10 Ω	T_{vj} = 25 °C, I_C = 75 A		182		ns
			T_{vj} = 175 °C, I_C = 75 A		216		
Fall time (inductive load)	t_f	V_{CC} = 400 V, V_{GE} = 0/15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 10 Ω	T_{vj} = 25 °C, I_C = 75 A		36		ns
			T_{vj} = 175 °C, I_C = 75 A		58		
Turn-on energy	E_{on}	V_{CC} = 400 V, V_{GE} = 0/15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 10 Ω	T_{vj} = 25 °C, I_C = 75 A		1.9		mJ
			T_{vj} = 175 °C, I_C = 75 A		2.6		

（表格续下页……）

表 3　　（续）特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Turn-off energy	E_{off}	V_{CC} = 400 V, V_{GE} = 0/15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 10 Ω	T_{vj} = 25 °C, I_C = 75 A		1.1		mJ
			T_{vj} = 175 °C, I_C = 75 A		1.9		
Total switching energy	E_{ts}	V_{CC} = 400 V, V_{GE} = 0/15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 10 Ω	T_{vj} = 25 °C, I_C = 75 A		3		mJ
			T_{vj} = 175 °C, I_C = 75 A		4.5		
Operating junction temperature	T_{vj}			-40		175	°C

3　　二极管

表4　　最大额定值

Parameter	Symbol	Note or test condition		Values	Unit
Diode forward current, limited by T_{vjmax}	I_F	limited by bondwire	T_c = 25 °C	80	A
			T_c = 100 °C	80	
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpulse}			300	A
Power dissipation	P_{tot}		T_c = 25 °C	259	W
			T_c = 100 °C	129	

表5　　特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Diode forward voltage	V_F	I_F = 75 A	T_{vj} = 25 °C		1.65	2	V
			T_{vj} = 175 °C		1.6		
Diode reverse recovery time	t_{rr}	V_R = 400 V, $R_{G(on)}$ = 10 Ω	T_{vj} = 25 °C, I_F = 75 A		97		ns
			T_{vj} = 175 °C, I_F = 75 A		161		
Diode reverse recovery charge	Q_{rr}	V_R = 400 V, $R_{G(on)}$ = 10 Ω	T_{vj} = 25 °C, I_F = 75 A		2		µC
			T_{vj} = 175 °C, I_F = 75 A		4.8		

（表格续下页……）

表 5　　（续） 特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Diode peak reverse recovery current	I_{rrm}	V_R = 400 V, $R_{G(on)}$ = 10 Ω	T_{vj} = 25 °C, I_F = 75 A		35.4		A
			T_{vj} = 175 °C, I_F = 75 A		52.3		
Diode peak rate of fall of reverse recovery current	di_{rr}/dt	V_R = 400 V, $R_{G(on)}$ = 10 Ω	T_{vj} = 25 °C, I_F = 75 A		-530		A/µs
			T_{vj} = 175 °C, I_F = 75 A		-470		
Reverse recovery energy	E_{rec}	V_R = 400 V, $R_{G(on)}$ = 10 Ω	T_{vj} = 25 °C, I_F = 75 A		0.45		mJ
			T_{vj} = 175 °C, I_F = 75 A		1.22		
Operating junction temperature	T_{vj}			-40		175	°C

注： *为了获得最佳的使用寿命和可靠性，英飞凌建议工作条件不超过本数据手册中所述最大额定值的80%。*

除非另有规定，电气特性均在 T_{vj} = 25°C 的条件下测得。

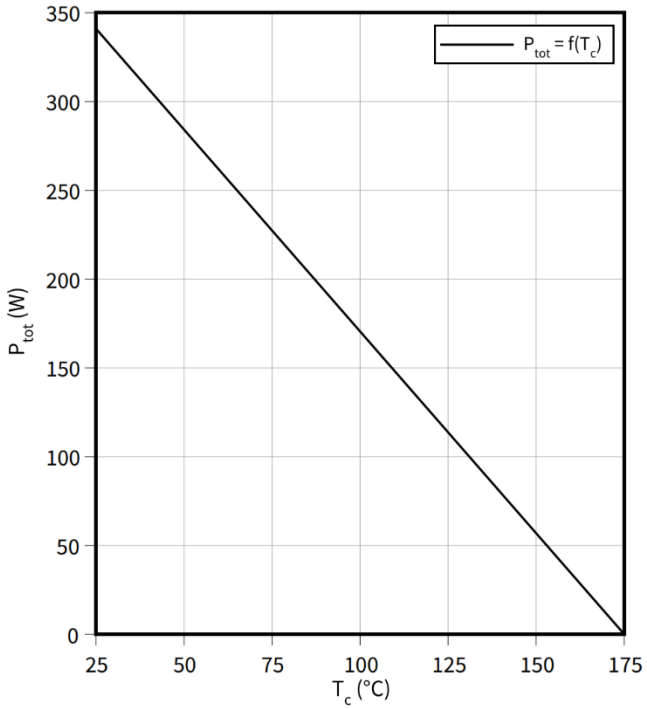
动态测试电路，寄生电感 L_σ = 8 nH，寄生电容 C_σ = 30 pF，如图 E 所示。能量损耗包括“拖尾”和二极管反向恢复。

4 特性图

Power dissipation as a function of case temperature

$P_{tot} = f(T_c)$

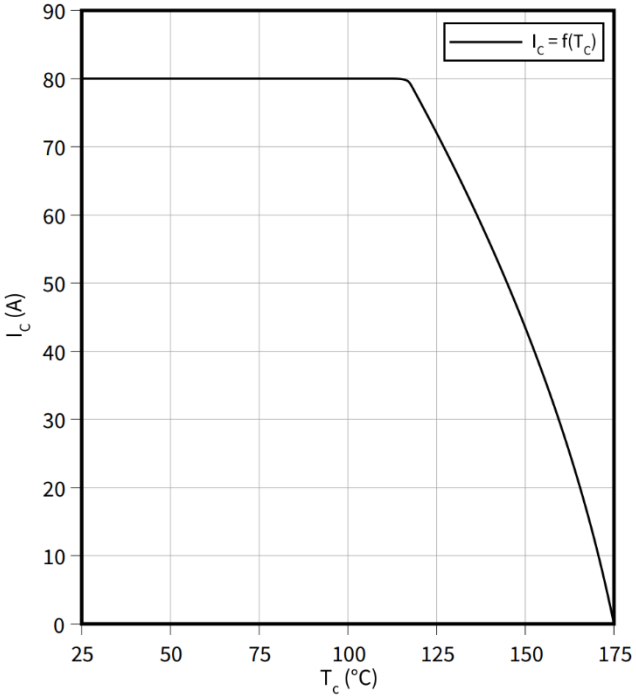
$T_{vj} \leq 175\ °C$



Collector current as a function of case temperature

$I_C = f(T_c)$

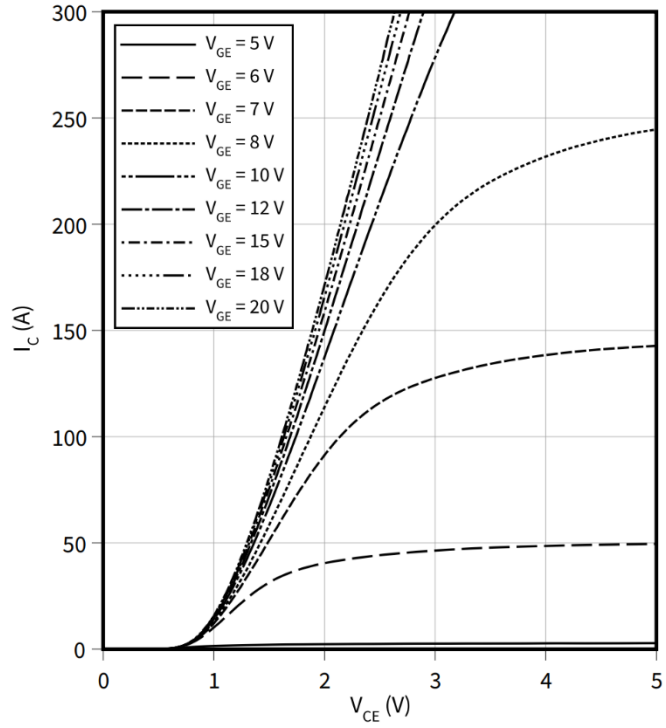
$T_{vj} \leq 175\ °C, V_{GE} \geq 15\ V$



Typical output characteristic

$I_C = f(V_{CE})$

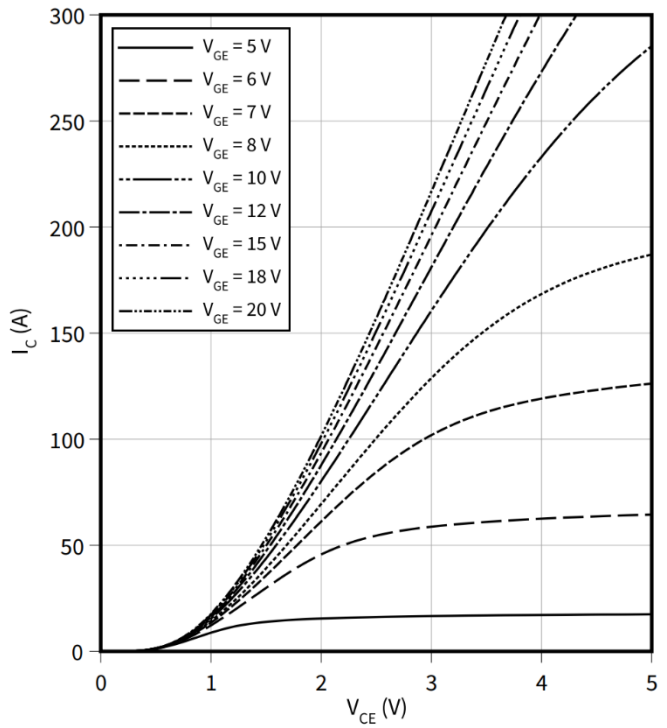
$T_{vj} = 25\ °C$



Typical output characteristic

$I_C = f(V_{CE})$

$T_{vj} = 175\ °C$

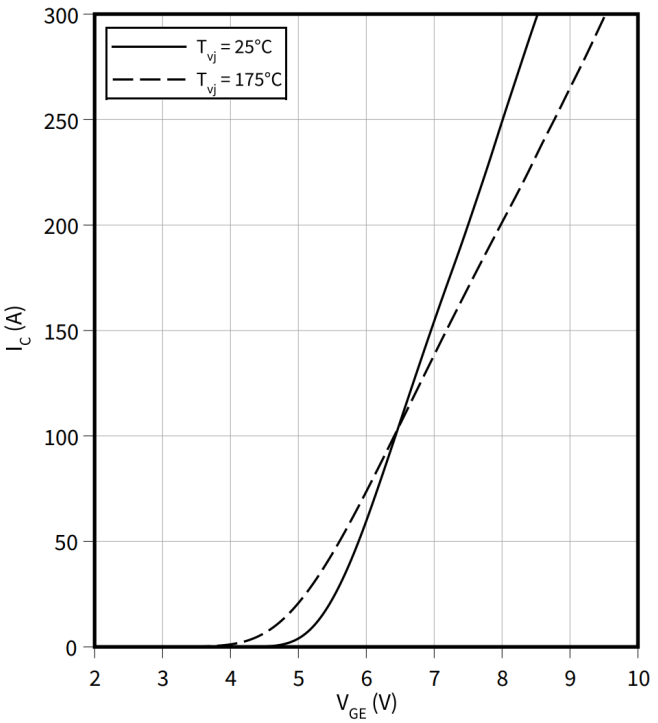


4 特性图

Typical transfer characteristic

$I_C = f(V_{GE})$

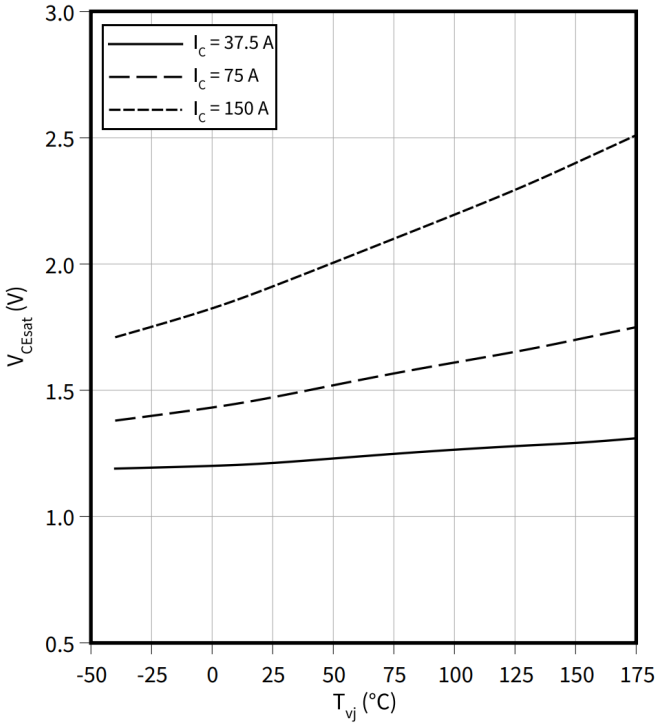
$V_{CE} = 20$ V



Typical collector-emitter saturation voltage as a function of junction temperature

$V_{CEsat} = f(T_{vj})$

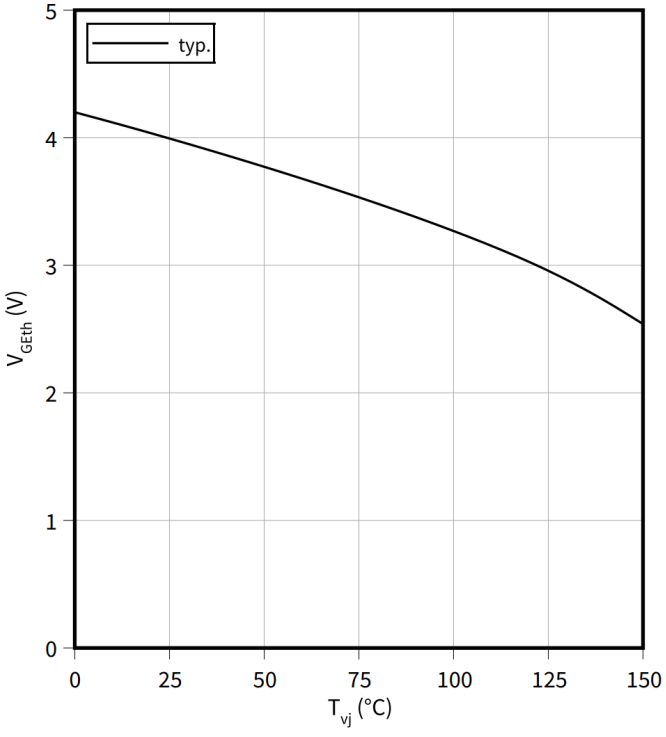
$V_{GE} = 15$ V



Gate-emitter threshold voltage as a function of junction temperature

$V_{GEth} = f(T_{vj})$

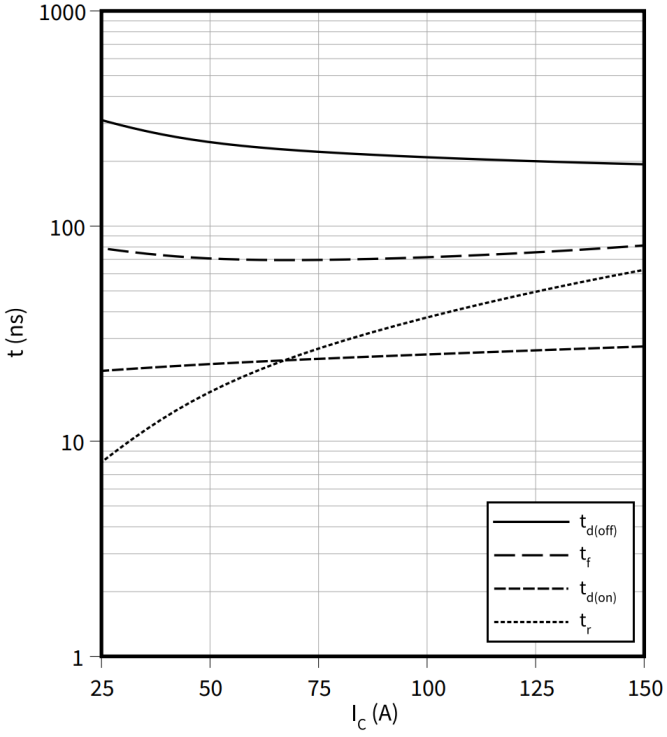
$I_C = 0.66$ mA



Typical switching times as a function of collector current

$t = f(I_C)$

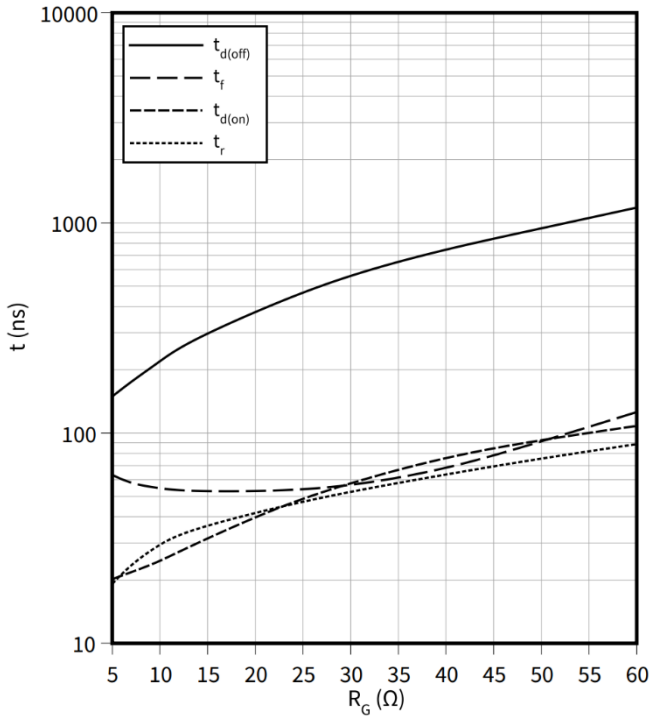
$V_{CC} = 400$ V, $T_{vj} = 175$ °C, $V_{GE} = 0/15$ V, $R_G = 10$ Ω



Typical switching times as a function of gate resistor

$t = f(R_G)$

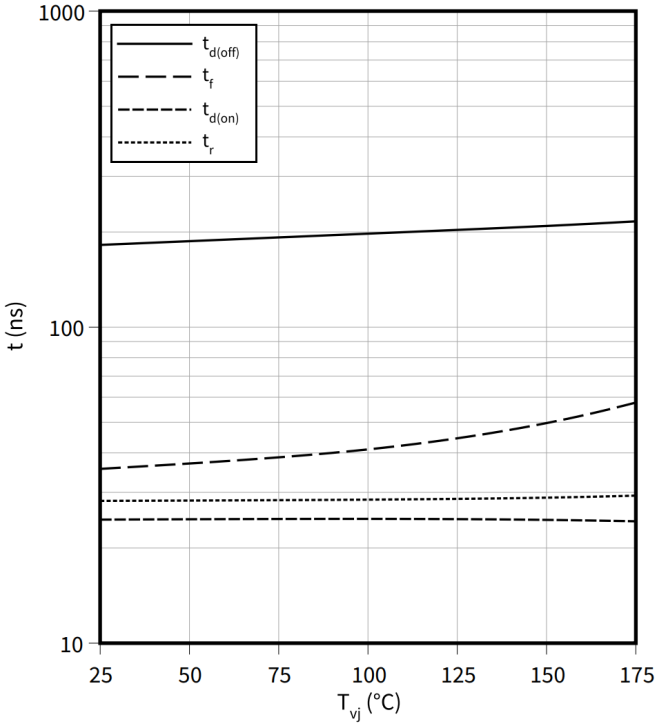
$I_C = 75\ A$, $V_{CC} = 400\ V$, $T_{vj} = 175\ °C$, $V_{GE} = 0/15\ V$



Typical switching times as a function of junction temperature

$t = f(T_{vj})$

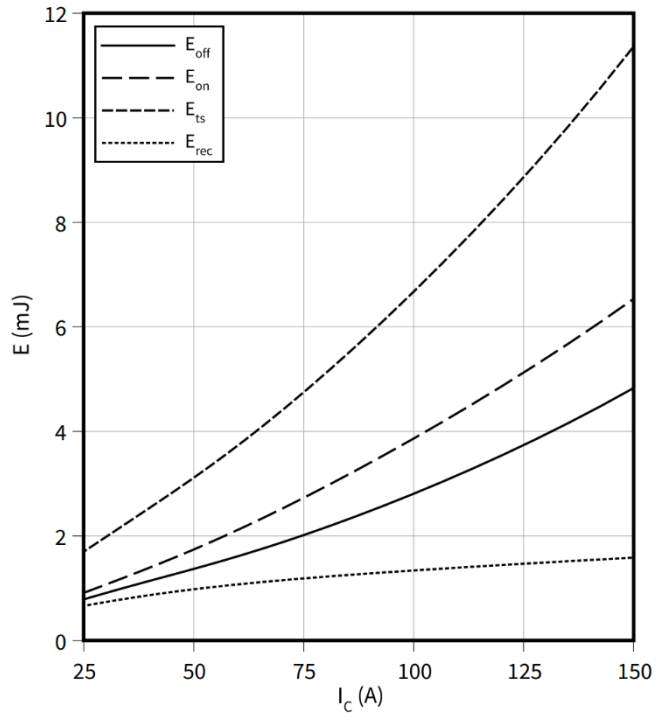
$I_C = 75\ A$, $V_{CC} = 400\ V$, $V_{GE} = 0/15\ V$, $R_G = 10\ Ω$



Typical switching energy losses as a function of collector current

$E = f(I_C)$

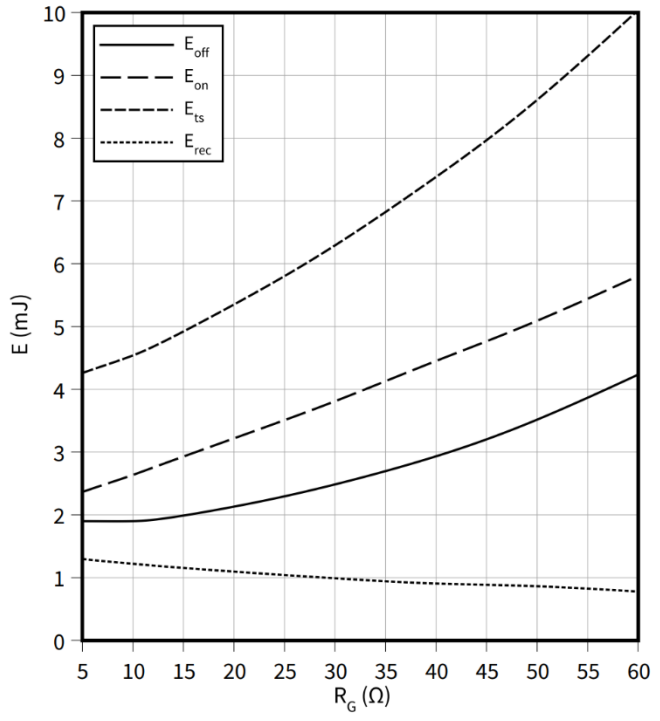
$V_{CC} = 400\ V$, $T_{vj} = 175\ °C$, $V_{GE} = 0/15\ V$, $R_G = 10\ Ω$



Typical switching energy losses as a function of gate resistor

$E = f(R_G)$

$I_C = 75\ A$, $V_{CC} = 400\ V$, $T_{vj} = 175\ °C$, $V_{GE} = 0/15\ V$

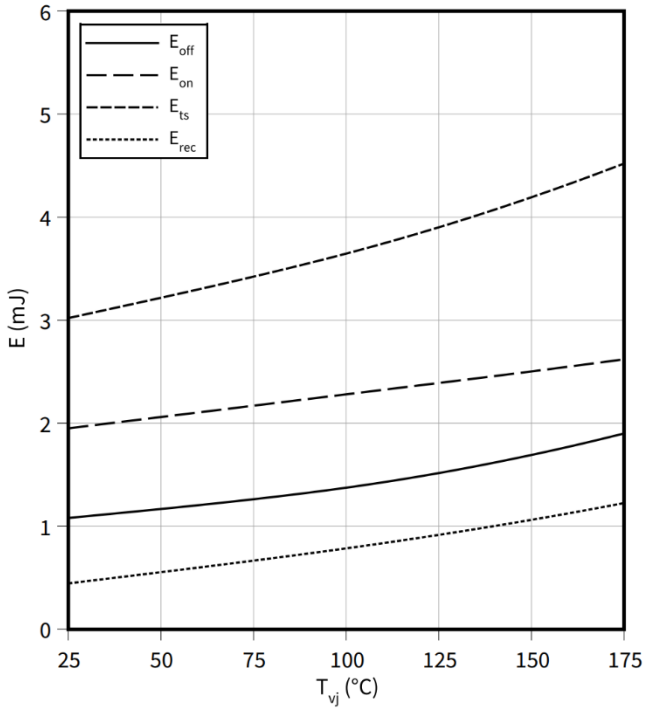


4 特性图

Typical switching energy losses as a function of junction temperature

$E = f(T_{vj})$

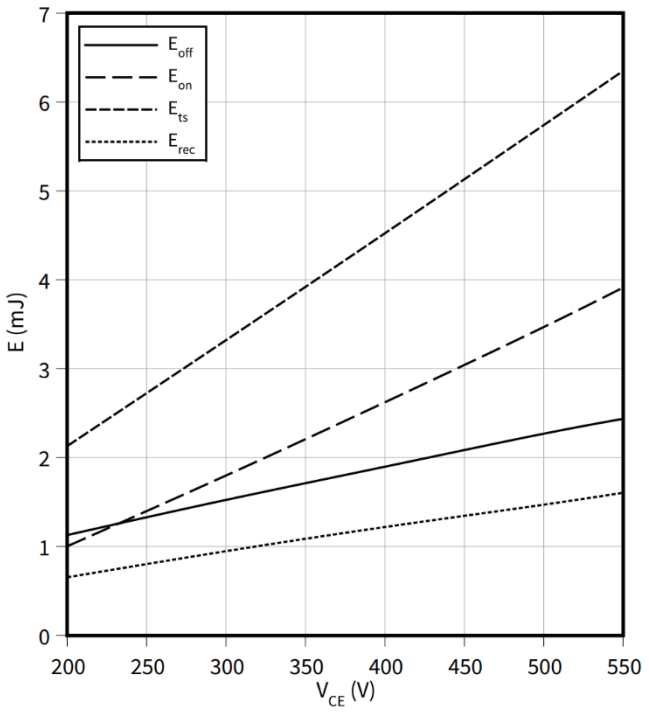
$I_C = 75\ A$, $V_{CC} = 400\ V$, $V_{GE} = 0/15\ V$, $R_G = 10\ \Omega$



Typical switching energy losses as a function of collector emitter voltage

$E = f(V_{CE})$

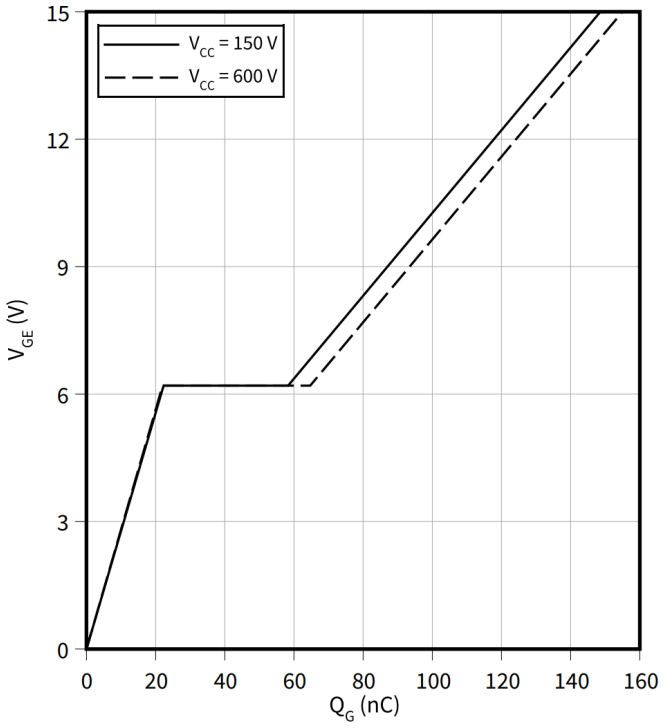
$I_C = 75\ A$, $T_{vj} = 175\ °C$, $V_{GE} = 0/15\ V$, $R_G = 10\ \Omega$



Typical gate charge

$V_{GE} = f(Q_G)$

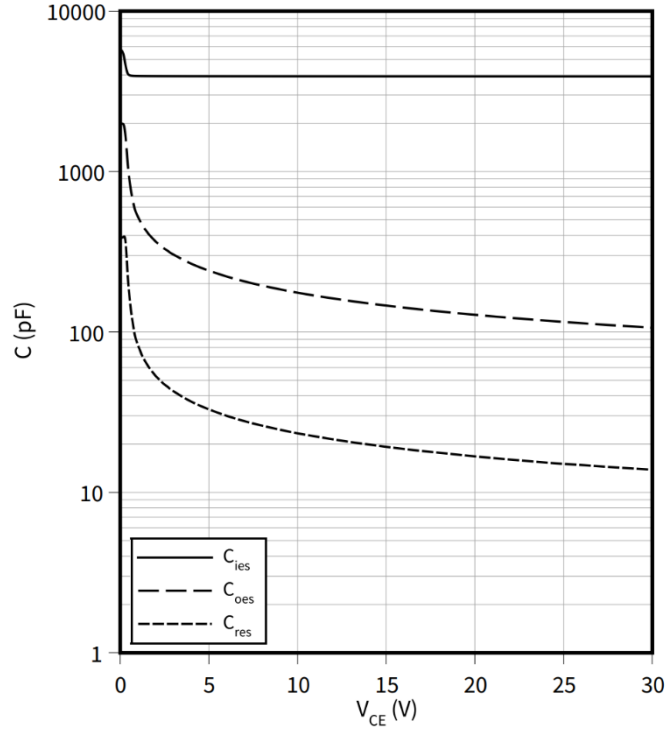
$I_C = 75\ A$



Typical capacitance as a function of collector-emitter voltage

$C = f(V_{CE})$

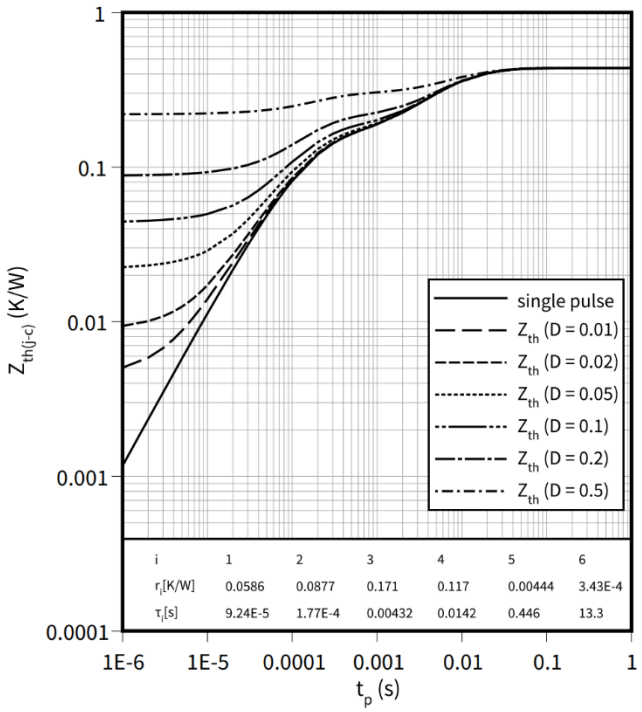
$f = 100\ kHz$, $V_{GE} = 0\ V$



4 特性图

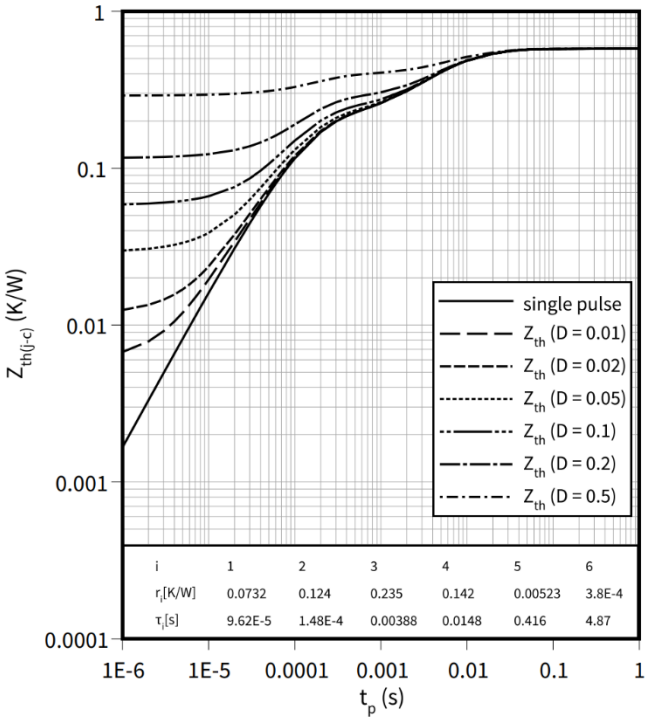
IGBT transient thermal impedance as a function of pulse width

$Z_{th(j-c)} = f(t_p)$
$D = t_p/T$



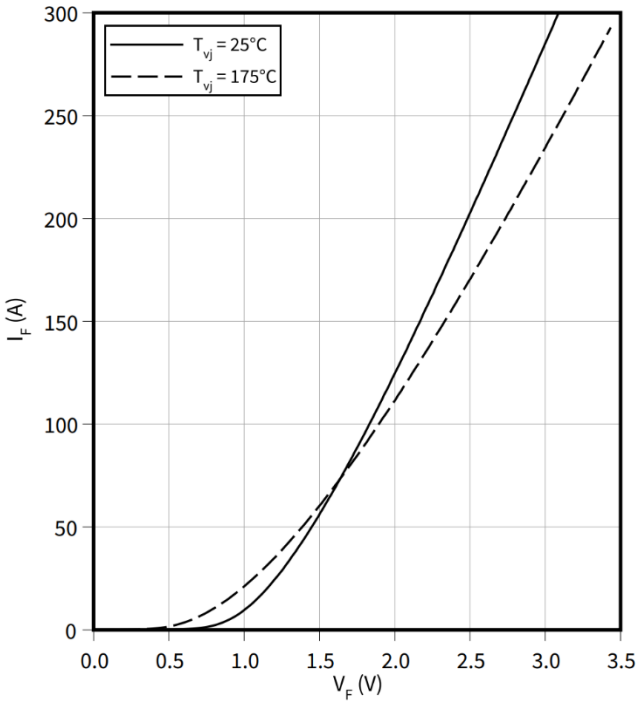
Diode transient thermal impedance as a function of pulse width

$Z_{th(j-c)} = f(t_p)$
$D = t_p/T$



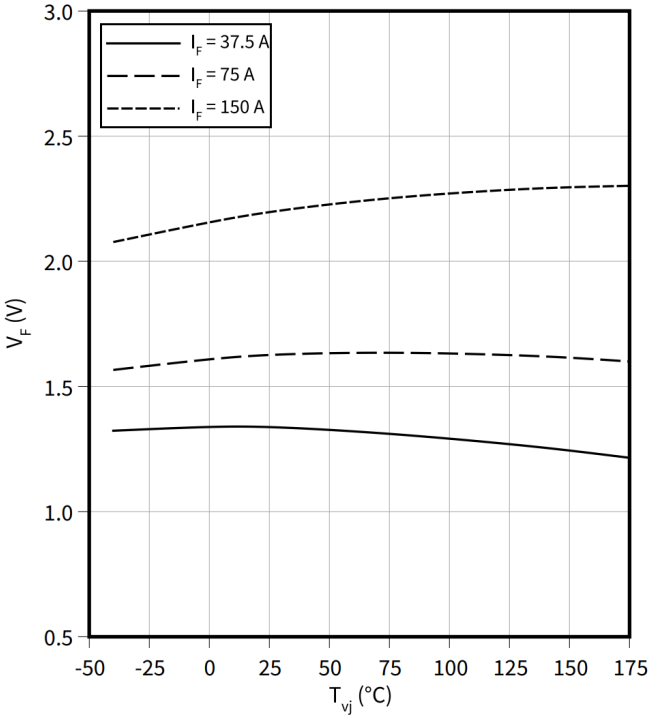
Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



Typical diode forward voltage as a function of junction temperature

$V_F = f(T_{vj})$

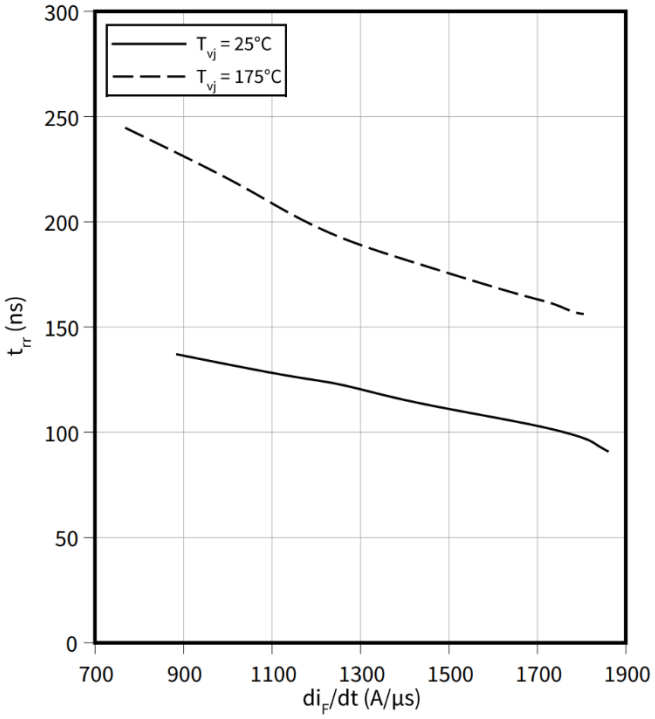


4 特性图

Typical reverse recovery time as a function of diode current slope

$t_{rr} = f(di_F/dt)$

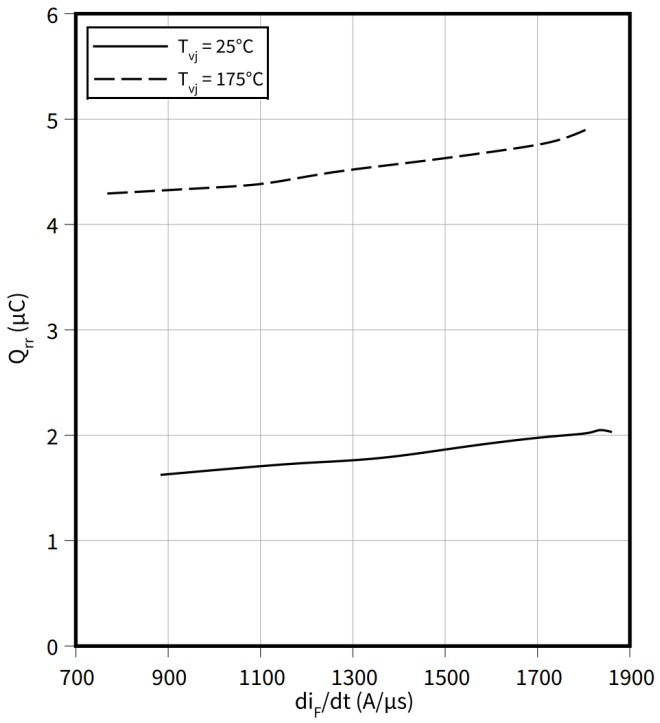
$V_R = 400$ V, $I_F = 75$ A



Typical reverse recovery charge as a function of diode current slope

$Q_{rr} = f(di_F/dt)$

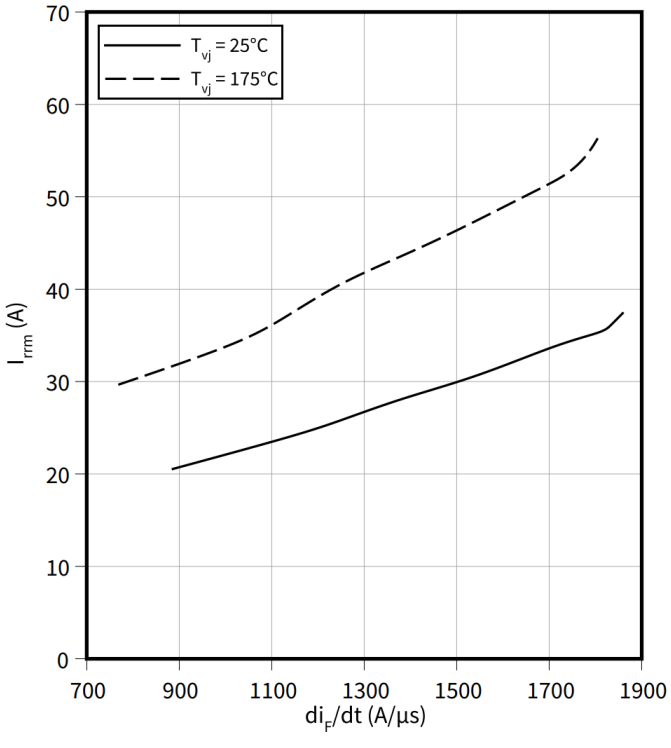
$V_R = 400$ V, $I_F = 75$ A



Typical reverse recovery current as a function of diode current slope

$I_{rrm} = f(di_F/dt)$

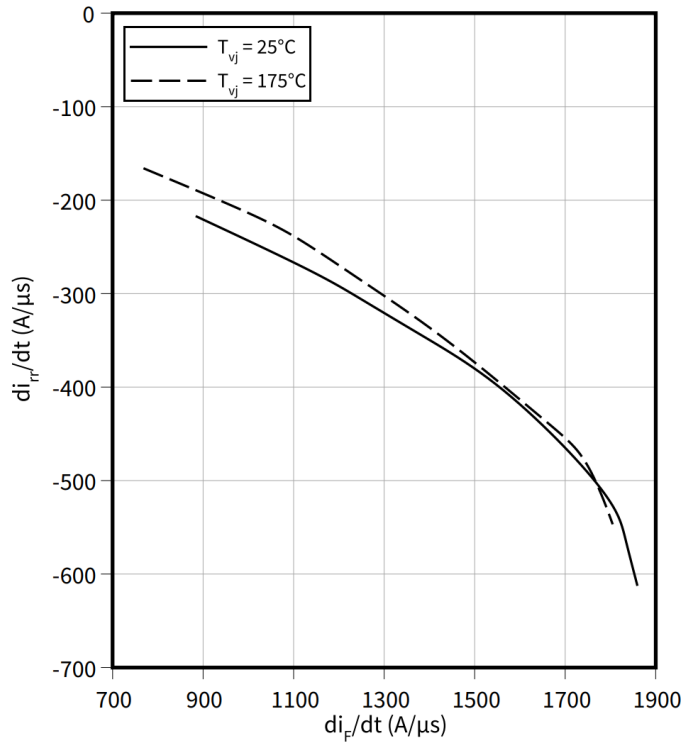
$V_R = 400$ V, $I_F = 75$ A



Typical diode peak rate of fall of reverse recovery current as a function of diode current slope

$di_{rr}/dt = f(di_F/dt)$ V_R

$= 400$ V, $I_F = 75$ A

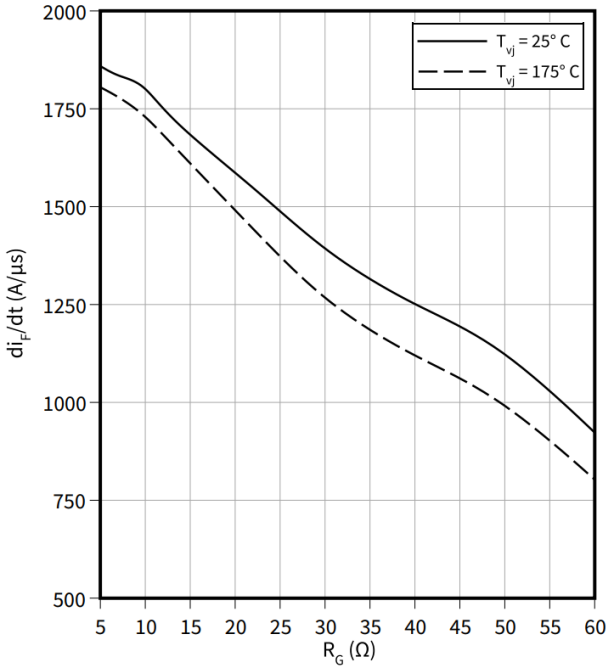


4 特性图

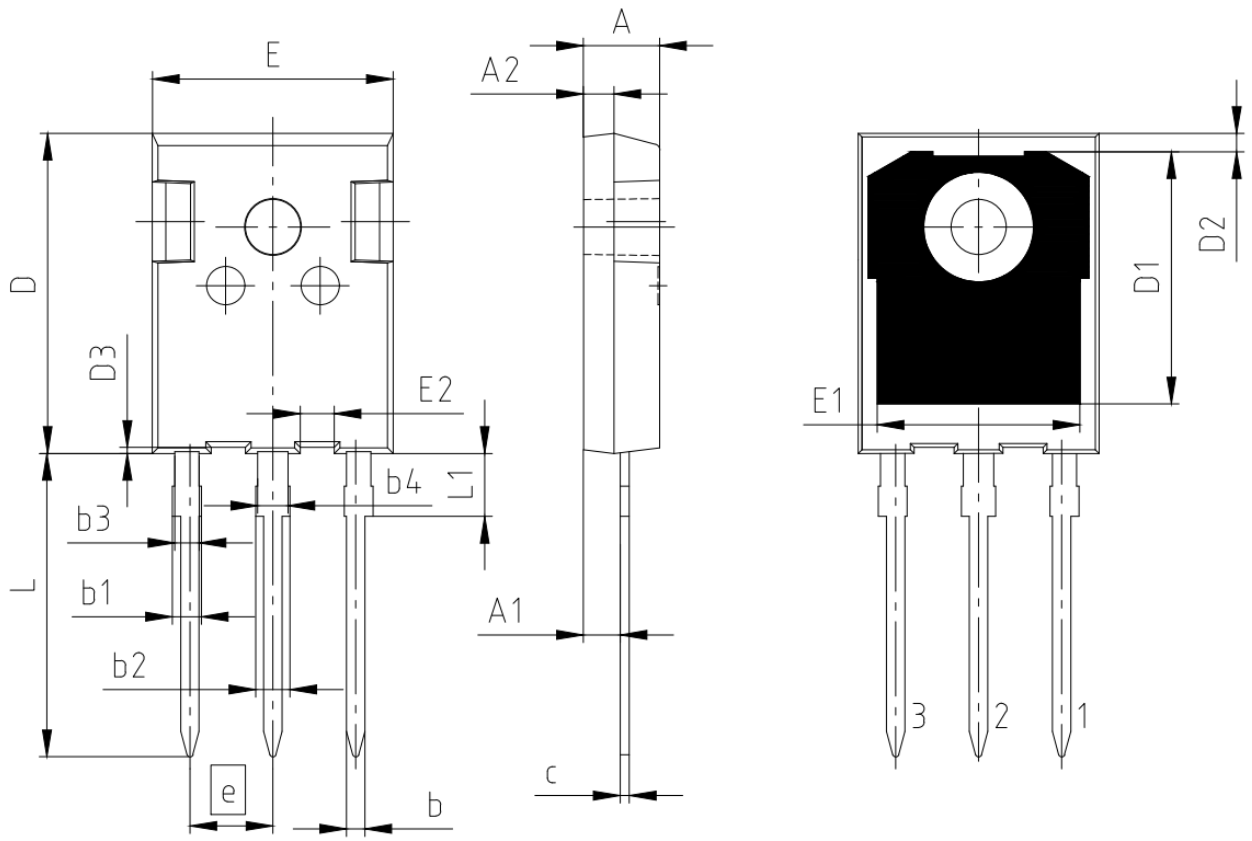
Typical diode current slope as a function of gate resistor

$di_F/dt = f(R_G)$

$V_R = 400\ V$, $I_F = 75\ A$



5 封装外形



PACKAGE - GROUP NUMBER:	PG-TO247-3-U04	
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	4.90	5.10
A1	2.31	2.51
A2	1.90	2.10
b	1.16	1.26
b1		1.90
b2		2.30
b3	1.55	1.65
b4	1.96	2.06
c	0.59	0.66
D	20.90	21.10
D1	16.25	16.85
D2	1.05	1.35
D3	0.55	0.65
E	15.70	15.90
E1	13.10	13.50
E2	2.14	2.34
e	5.44	
N	3	
L	19.80	20.10
L1	3.95	4.30

图 1

6 测试条件

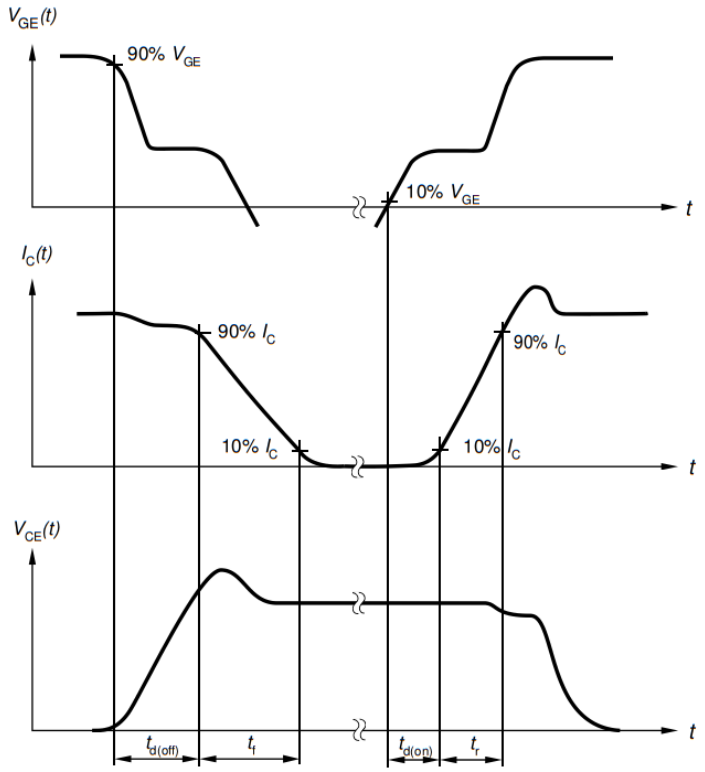


Figure A. **Definition of switching times**

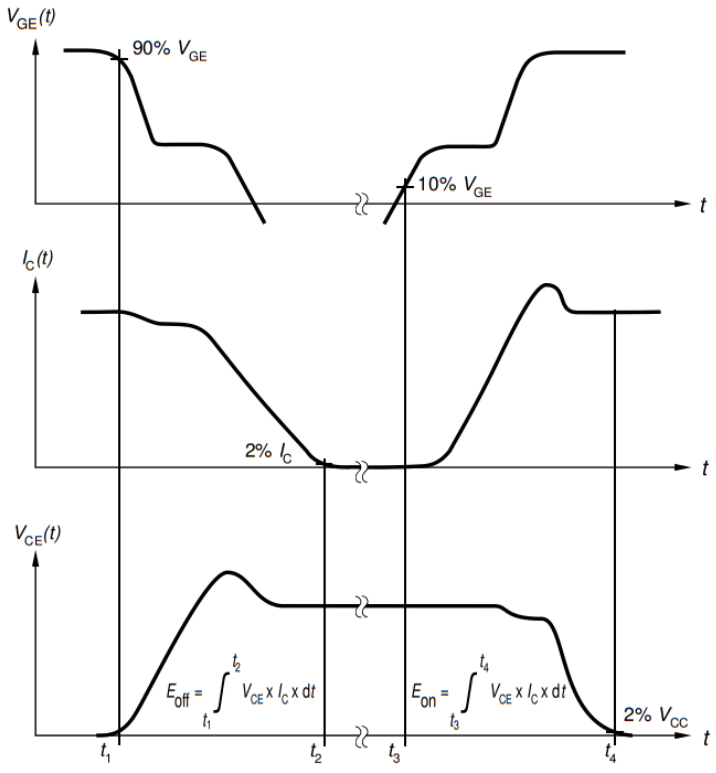


Figure B. **Definition of switching losses**

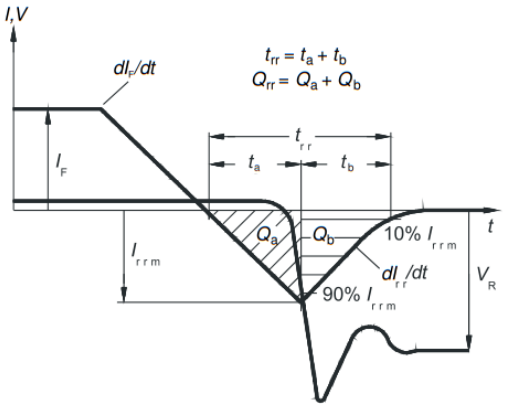


Figure C. **Definition of diode switching characteristics**

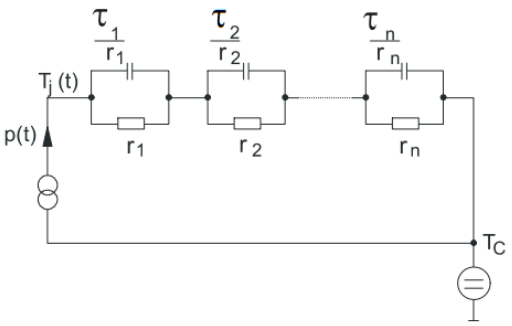


Figure D. **Thermal equivalent circuit**

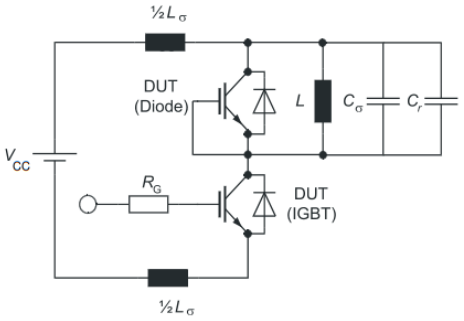


Figure E. **Dynamic test circuit**
Parasitic inductance L_σ,
parasitic capacitor C_σ,
relief capacitor C_r,
(only for ZVT switching)

图 2

修订记录

Document revision	Date of release	Description of changes
0.10	2025-03-19	Preliminary datasheet
0.20	2025-05-30	Corrected gate charge value in Table 3
1.00	2025-07-31	Final datasheet

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