FAIRCHILD SEMICONDUCTOR®

2013 年 12 月

FGH60N60SMD

600 V， 60 A 场截止 IGBT

特性

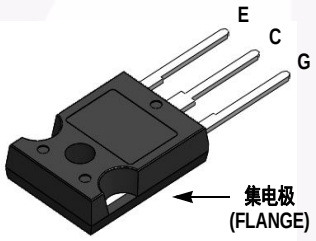
- 最大结温：T_J = 175°C
- 正温度系数，易于并联运行
- 高电流能力
- 低饱和电压：$V_{CE(sat)}$ = 1.9 V （典型值） @ I_C = 60 A
- 高输入阻抗
- 快速开关 E_{OFF} = 7.5 µJ/A
- 紧密的参数分布
- 符合 RoHS 标准

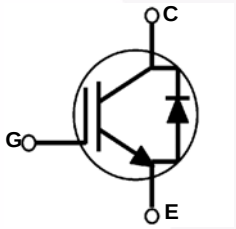
应用

- 太阳能逆变器、 UPS、电焊机、 PFC、电信、 ESS

概述

飞兆半导体的场截止第二代 IGBT 新系列采用新型场截止 IGBT 技术，为光伏逆变器、 UPS、焊机、通讯、 ESS 和 PFC 等低导通和开关损耗至关重要的应用提供最佳性能。





绝对最大额定值

符号	说明		额定值	单位
V_{CES}	集电极 - 发射极之间电压		600	V
V_{GES}	栅极 - 发射极间电压		± 20	V
	瞬态栅极至发射极电压		± 30	V
I_C	集电极电流	@ T_C = 25°C	120	A
	集电极电流	@ T_C = 100°C	60	A
$I_{CM\ (1)}$	集电极脉冲电流		180	A
I_F	二极管正向电流	@ T_C = 25°C	60	A
	二极管正向电流	@ T_C = 100°C	30	A
$I_{FM\ (1)}$	二极管最大正向脉冲电流		180	A
P_D	最大功耗	@ T_C = 25°C	600	W
	最大功耗	@ T_C = 100°C	300	W
T_J	工作结温		-55 至 +175	°C
T_{stg}	存储温度范围		-55 至 +175	°C
T_L	用于焊接的最大引脚温度，距离外壳 1/8"，持续 5 秒		300	°C

注意：
1: 重复率额定值：脉宽受最大结温限制

热性能

符号	参数	典型值	最大值	单位
$R_{\theta JC}$(IGBT)	结点 - 壳体的热阻		0.25	°C/W
$R_{\theta JC}$(Diode)	结点 - 壳体的热阻		1.1	°C/W
$R_{\theta JA}$	结至环境热阻		40	°C/W

封装标识与定购信息

器件编号	顶标	封装	包装方法	卷尺寸	带宽	数量
FGH60N60SMD	FGH60N60SMD	TO-247	塑料管	不适用	不适用	30

IGBT 电气特性 T_C = 25°C 除非另有说明

符号	参数	测试条件	最小值	典型值	最大值	单位
关断特性						
BV_{CES}	集电极 - 发射极击穿电压	V_{GE} = 0 V, I_C = 250 μA	600			V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	击穿温度系数电压	V_{GE} = 0 V, I_C = 250 μA		0.6		V/°C
I_{CES}	集电极切断电流	V_{CE} = V_{CES}, V_{GE} = 0 V			250	μA
I_{GES}	G-E 漏电流	V_{GE} = V_{GES}, V_{CE} = 0 V			±400	nA
导通特性						
$V_{GE(th)}$	G-E 阈值电压	I_C = 250 μA, V_{CE} = V_{GE}	3.5	4.5	6.0	V
$V_{CE(sat)}$	集电极 - 发射极间饱和电压	I_C = 60 A, V_{GE} = 15 V		1.9	2.5	V
		I_C = 60 A, V_{GE} = 15 V, T_C = 175°C		2.1		V
动态特性						
C_{ies}	输入电容	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz		2915		pF
C_{oes}	输出电容			270		pF
C_{res}	反向传输电容			85		pF
开关特性						
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 60 A, R_G = 3 Ω, V_{GE} = 15 V, 感性负载 , T_C = 25°C		18	27	ns
t_r	上升时间			47	70	ns
$t_{d(off)}$	关断延迟时间			104	146	ns
t_f	下降时间			50	68	ns
E_{on}	导通开关损耗			1.26	1.94	mJ
E_{off}	关断开关损耗			0.45	0.6	mJ
E_{ts}	总开关损耗			1.71	2.54	mJ
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 60 A, R_G = 3 Ω, V_{GE} = 15 V, 感性负载， T_C = 175°C		18		ns
t_r	上升时间			41		ns
$t_{d(off)}$	关断延迟时间			115		ns
t_f	下降时间			48		ns
E_{on}	导通开关损耗			2.1		mJ
E_{off}	关断开关损耗			0.78		mJ
E_{ts}	总开关损耗			2.88		mJ

IGBT 电气特性（续）

符号	参数	测试条件	最小值	典型值	最大值	单位
Q_g	总栅极电荷	V_{CE} = 400 V, I_C = 60 A, V_{GE} = 15 V		189	284	nC
Q_{ge}	栅极 - 发射极间电荷			20	30	nC
Q_{gc}	栅极 - 发射极间电荷			91	137	nC

二极管电气特性 T_C = 25° 除非另有说明

符号	参数	测试条件		最小值	典型值	最大值	单位
V_{FM}	二极管正向电压	I_F = 30 A	T_C = 25°C		2.1	2.7	V
			T_C = 175°C		1.7		
E_{rec}	反向恢复电能	IF = 50 A, dIF/dt = 200 A/ms	T_C = 175°C		79		uJ
t_{rr}	二极管反向恢复时间		T_C = 25°C		30	39	ns
			T_C = 175°C		72		
Qrr	二极管反向恢复电荷		T_C = 25°C		44	62	nC
			T_C = 175°C		238		

典型性能特征

图 1. 典型输出特性

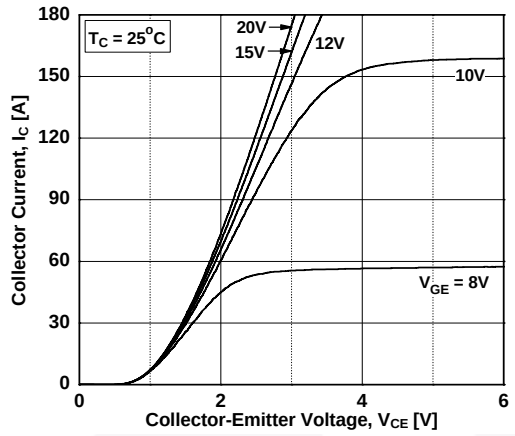


图 2. 典型输出特性

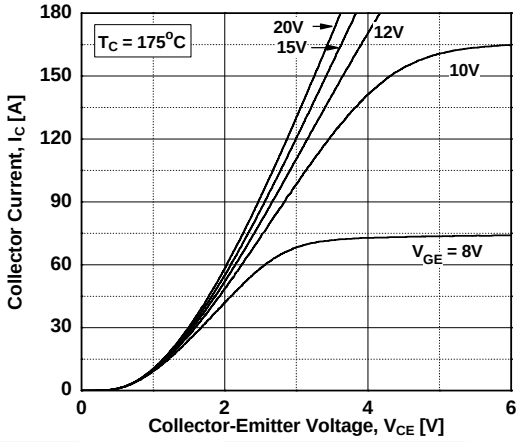


图 3. 典型饱和电压导通特性

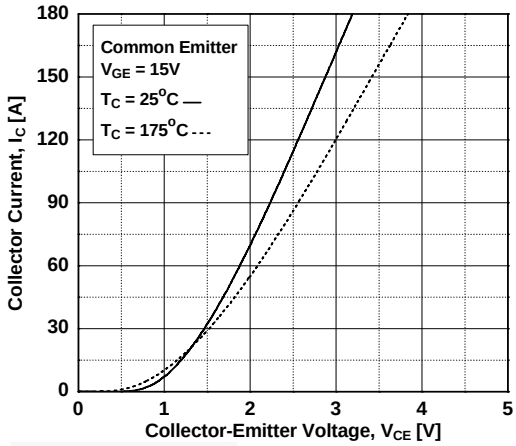


图 4. 传递特性

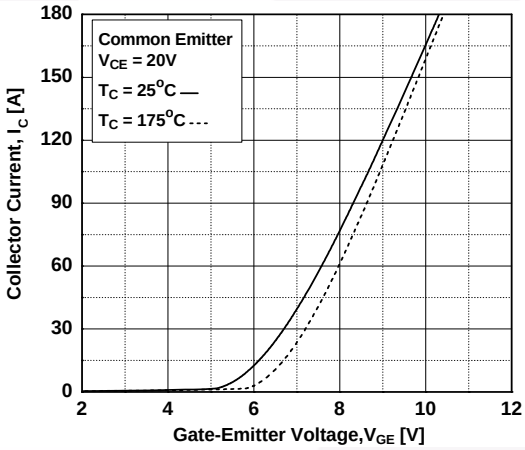


图 5. 饱和电压与外壳的关系在不同电流下的温度

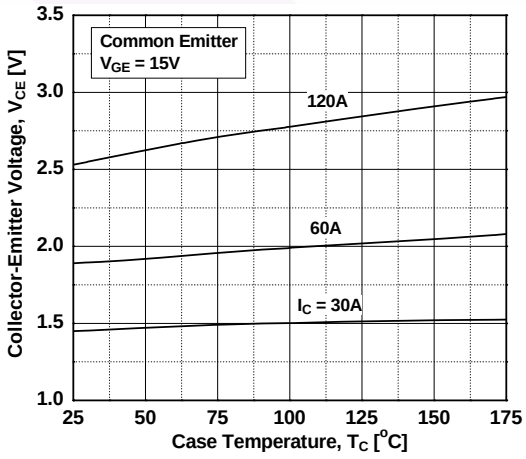
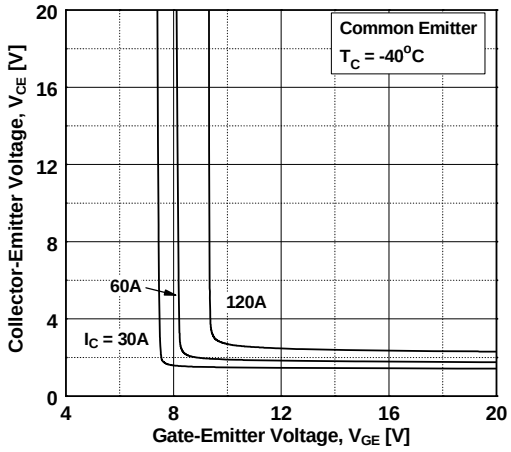


图 6. 饱和电压与 V_{GE} 的关系



典型性能特征

图 7. 饱和电压与 V_{GE} 的关系

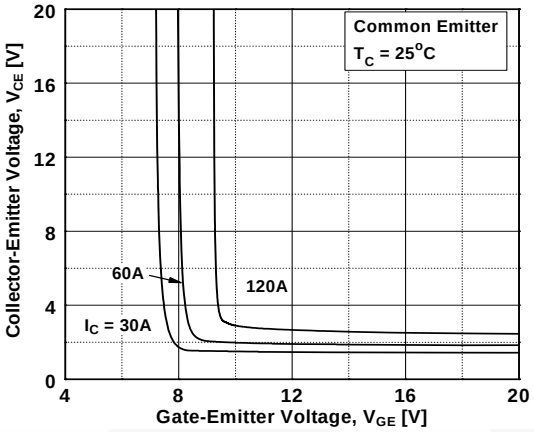


图 8. 饱和电压与 V_{GE} 的关系

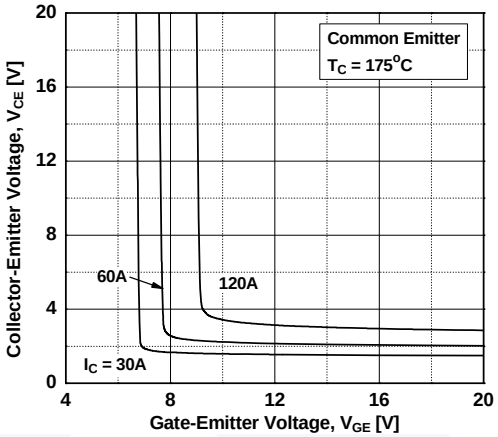


图 9. 电容特性

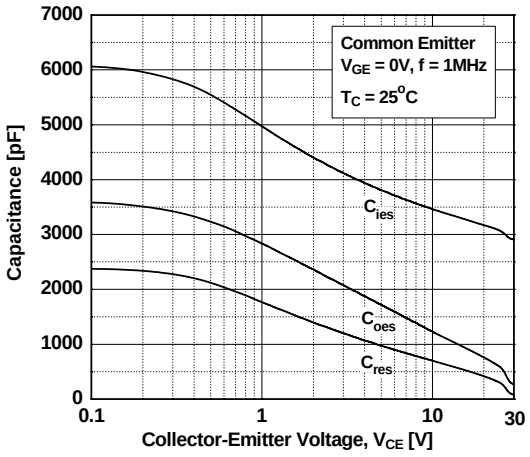


图 10. 栅极电荷特性

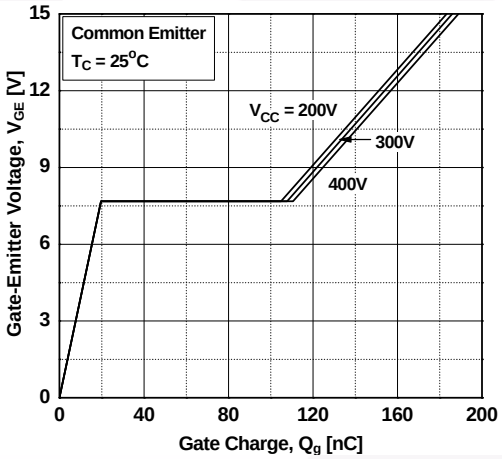


图 11. SOA 特性

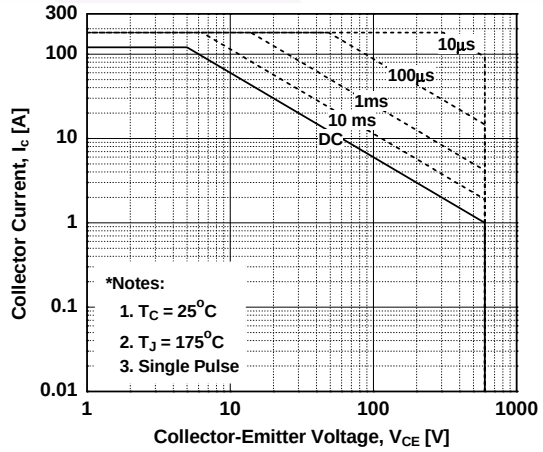
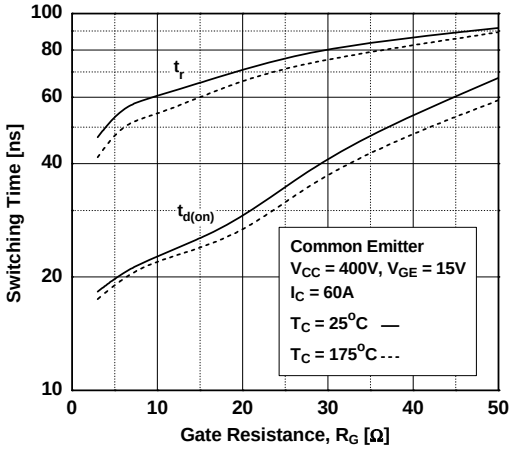


图 12. 开启特性与栅极阻抗



典型性能特征

图 13. 关断特性与栅极电阻的关系

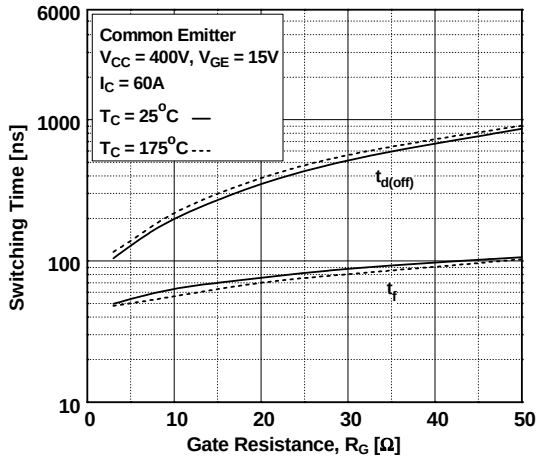


图 14. 开启特性与集电极电流

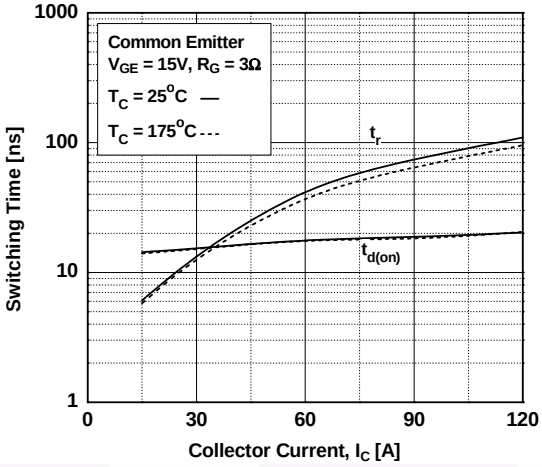


图 15. 关断特性与集电极电流的关系

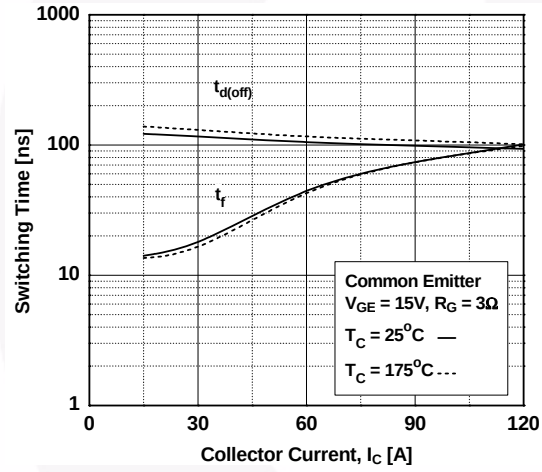


图 16. 开关损耗与栅极电阻

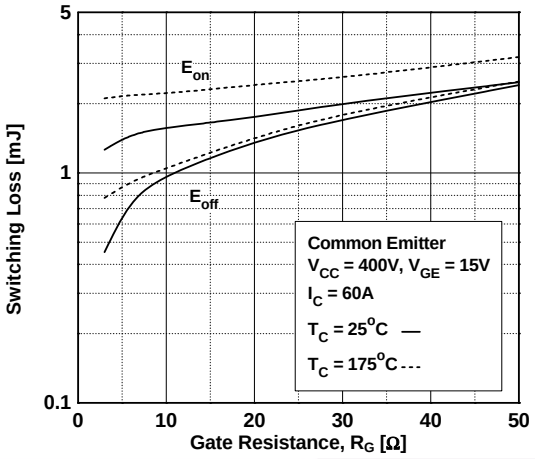


图 17. 开关损耗与集电极电流

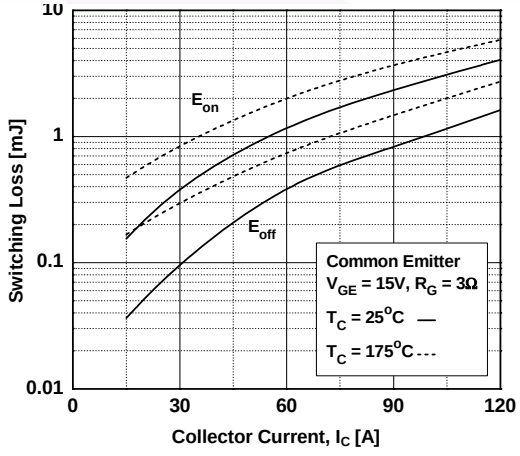
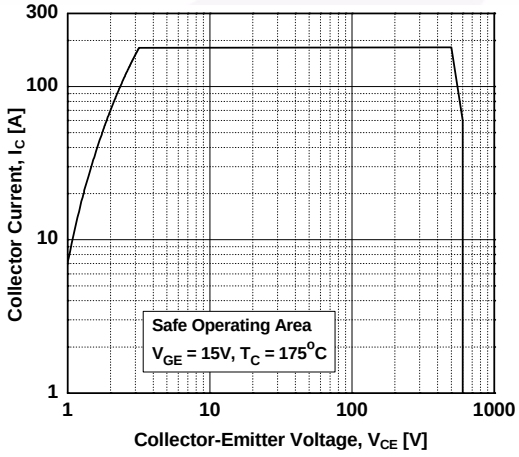


图 18. 关断开关 SOA 特性



典型性能特征

图 19. 电流降额

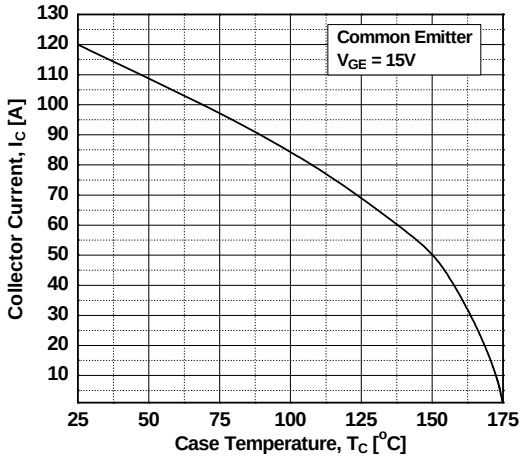


图 20. 负载电流与 频率的关系

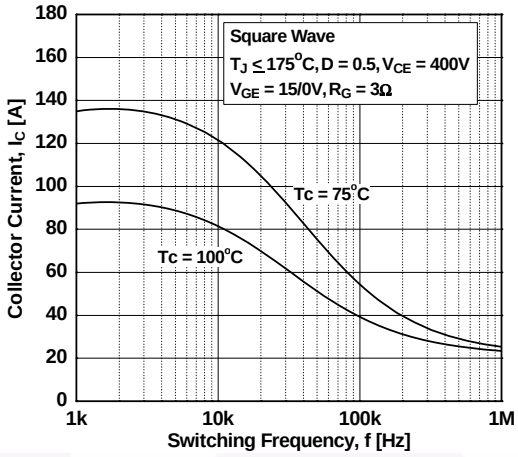


图 21. 正向特性

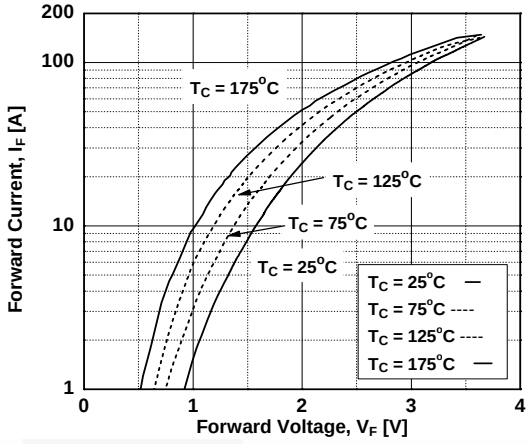


图 22. 反向电流

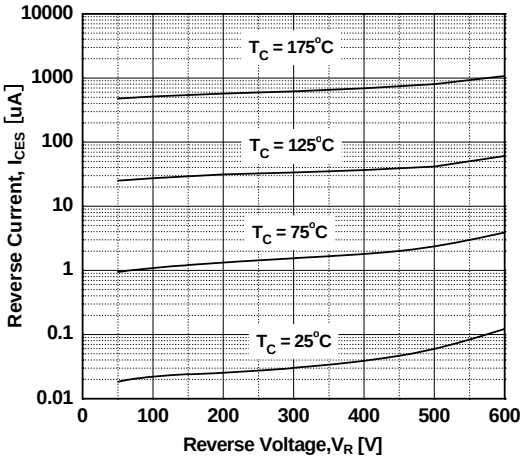


图 23. 存储电荷

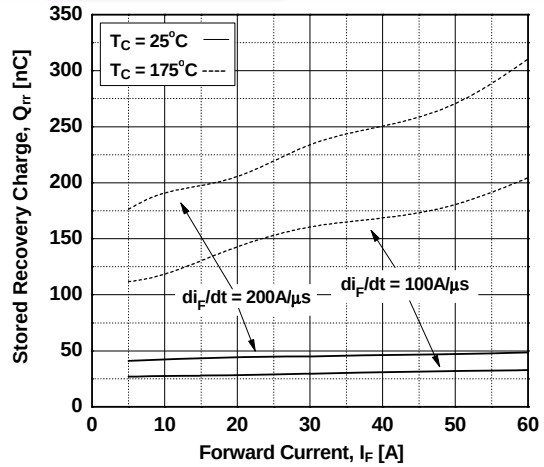
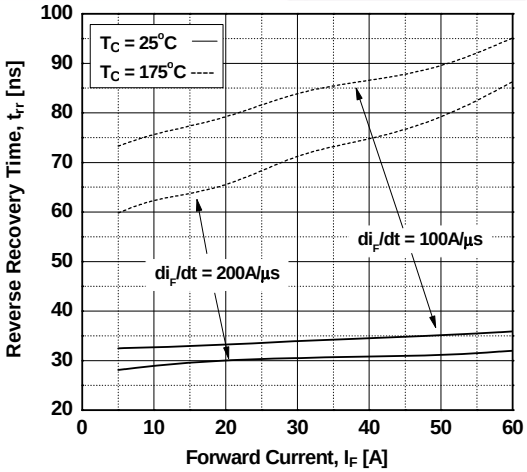


图 24. 反向恢复时间



典型性能特征

图 25. IGBT 瞬态热阻抗

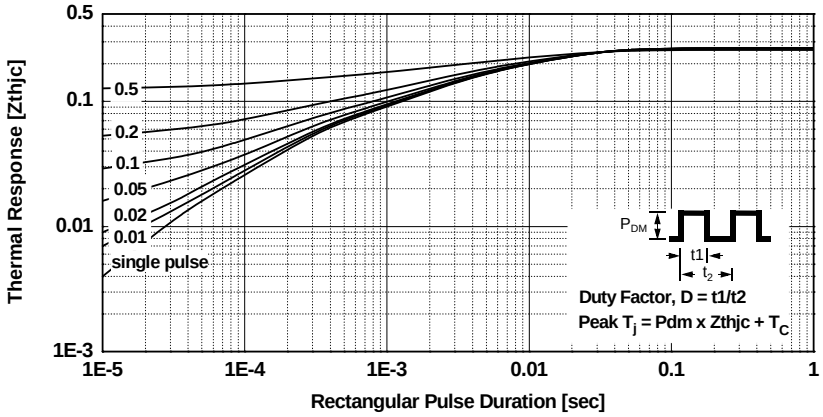
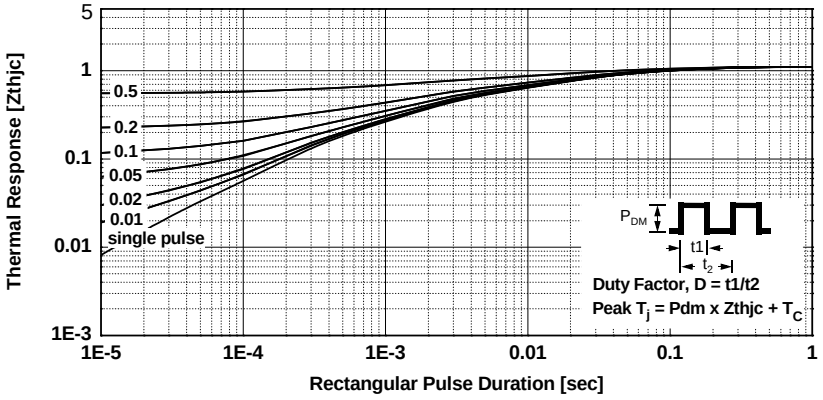


图 26. 二极管瞬态热阻抗



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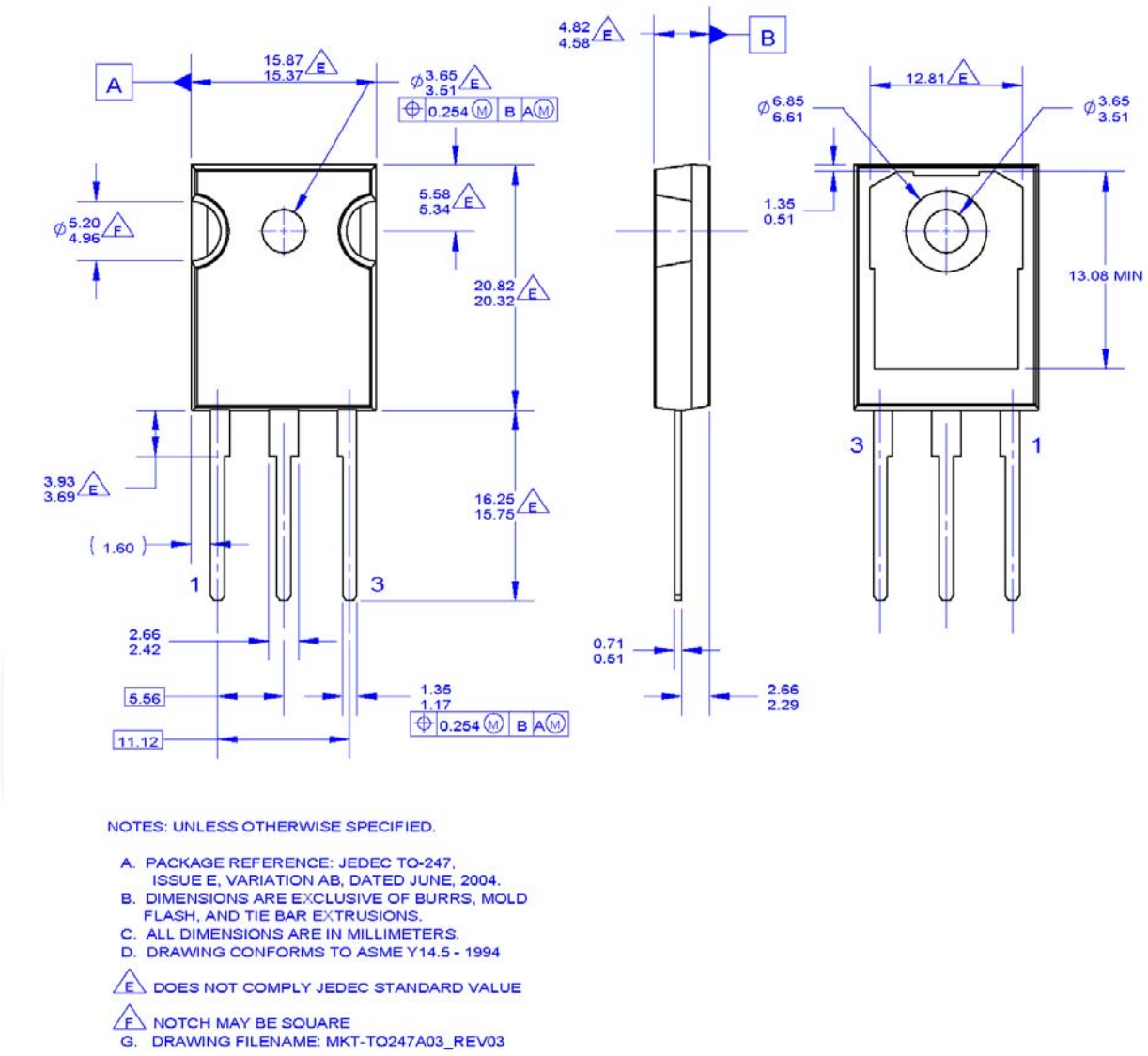

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E. DOES NOT COMPLY JEDEC STANDARD VALUE
F. NOTCH MAY BE SQUARE
G. DRAWING FILENAME: MKT-TO247A03_REV03

图 27. TO-247 3L - TO-247，模塑封装， 3 引脚， JEDEC 变体 AB

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ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.Fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufactures of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed application, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handing and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address and warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

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