FAIRCHILD SEMICONDUCTOR®

2013 年 12 月

FGA60N65SMD

650 V, 60 A 场截止 IGBT

特性

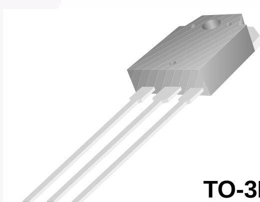
- 最大结温：T_J = 175°C
- 正温度系数，易于并联运行
- 高电流能力
- 低饱和电压：$V_{CE(sat)}$ = 1.9 V (Typ.) @ I_C = 60 A
- 快速开关：E_{OFF} = 7.5 μJ/A
- 紧密的参数分布
- 符合 RoHS 标准

应用

- 光伏逆变器、 UPS、焊机、 PFC、通信电源、 ESS

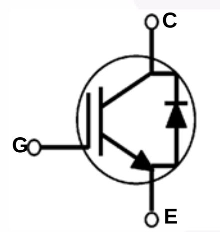
概述

飞兆半导体的新型场截止第二代 IGBT 系列产品采用创新型场截止 IGBT 技术，为光伏逆变器、UPS、焊机、通信电源、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。



G C E

TO-3PN



绝对最大额定值

符号	说明		额定值	单位
V_{CES}	集电极－发射极间电压		650	V
V_{GES}	栅极－发射极间电压		± 20	V
	瞬态栅极－发射极间电压		± 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)	结点一壳体的热阻		0.25	°C/W
$R_{\theta JC}$(Diode)	结点一壳体的热阻		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

器件标识	器件	封装	卷尺寸	带宽	数量
FGA60N65SMD	FGA60N65SMD	TO-3PN			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}	集电极一发射极击穿电压	V_{GE} = 0 V, I_C = 250 µA	650			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
$V_{CE(sat)}$	集电极一发射极间饱和电压	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 W, 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			1.54	2.31	mJ
E_{off}	关断开关损耗			0.45	0.60	mJ
E_{ts}	总开关损耗			1.99	2.91	mJ
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 60 A, R_G = 3 W, 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			2.08		mJ
E_{off}	关断开关损耗			0.78		mJ
E_{ts}	总开关损耗			2.86		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－集电极间电荷			91	137	nC

二极管电气特性 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
V_{FM}	二极管正向电压	I_F = 30 A	T_C = 25°C		2.1	2.6	V
			T_C = 175°C		1.7		
E_{rec}	反向恢复电能	I_F =30 A, dI_F/dt = 200 A/µs	T_C = 175°C		127		uJ
t_{rr}	二极管反向恢复时间		T_C = 25°C		47		ns
			T_C = 175°C		212		
Q_{rr}	二极管反向恢复电荷		T_C = 25°C		87		nC
			T_C = 175°C		933		

典型性能特征

图 1. 典型输出特性

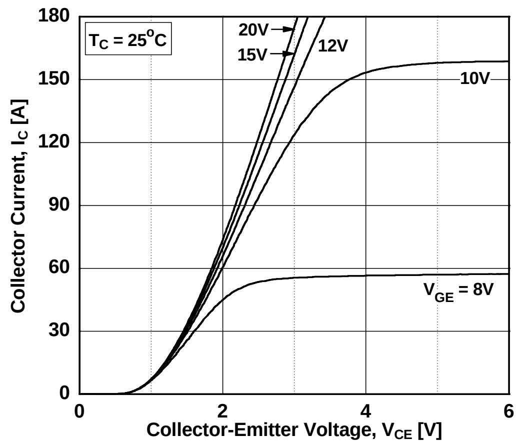


图 2. 典型输出特性

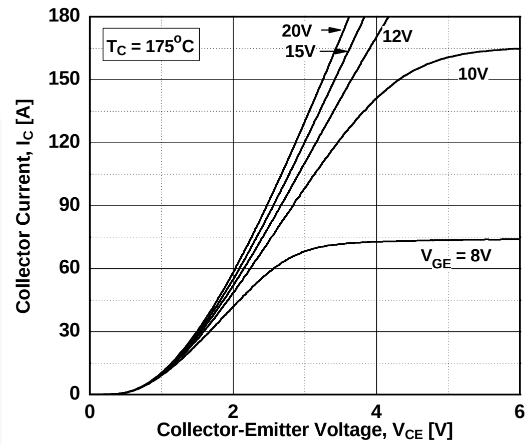


图 3. 典型饱和电压特性

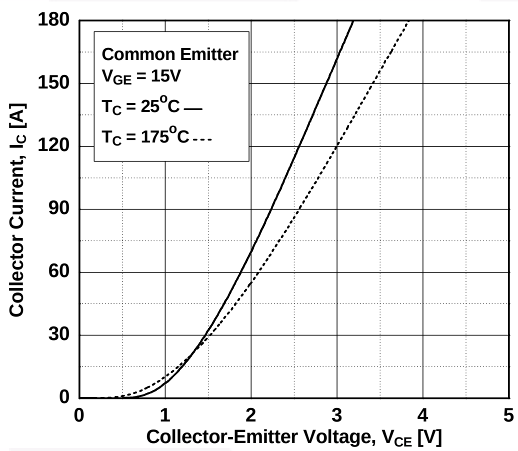


图 4. 典型饱和电压与可变电流强度下壳温的关系

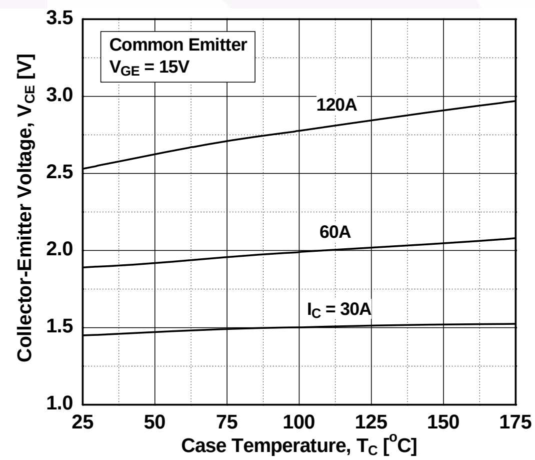


图 5. 饱和电压与 V_{GE} 的关系

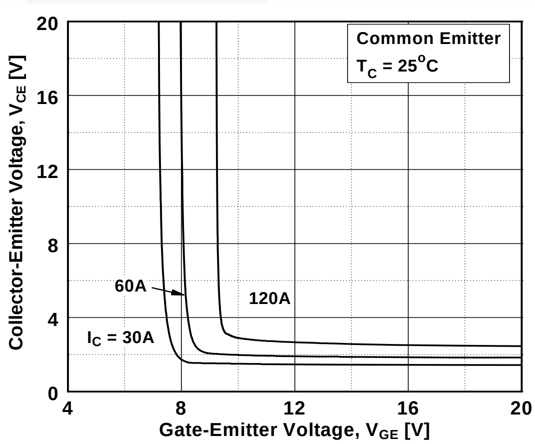
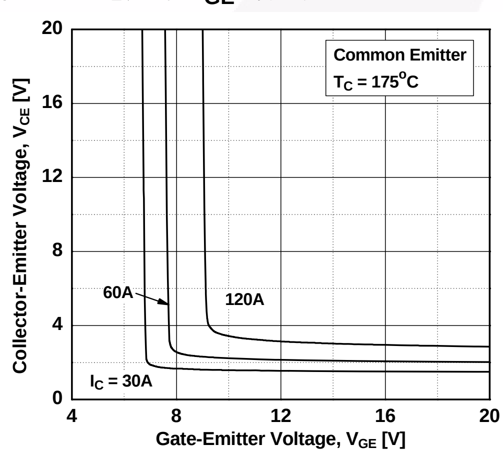


图 6. 饱和电压与 V_{GE} 的关系



典型性能特征

图 7. 电容特性

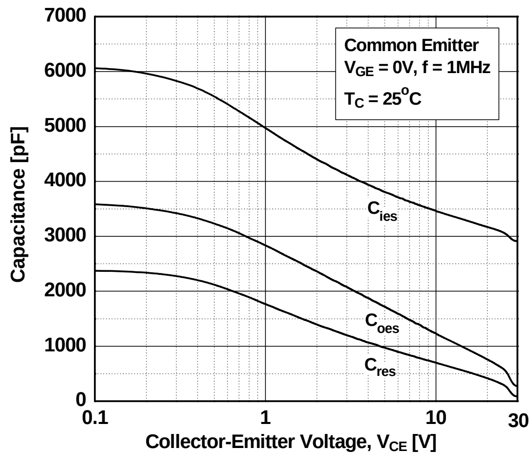


图 8. 栅极电荷特性

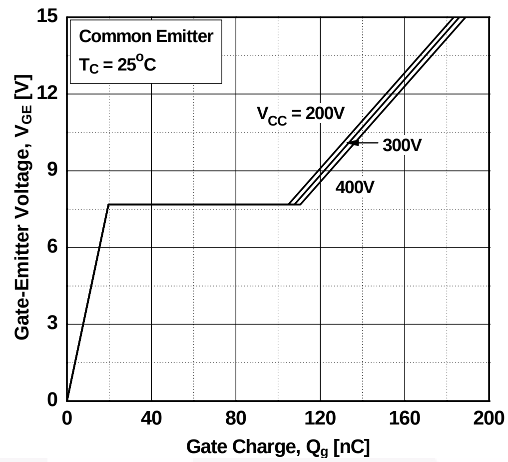


图 9. 导通特性与栅极电阻的关系

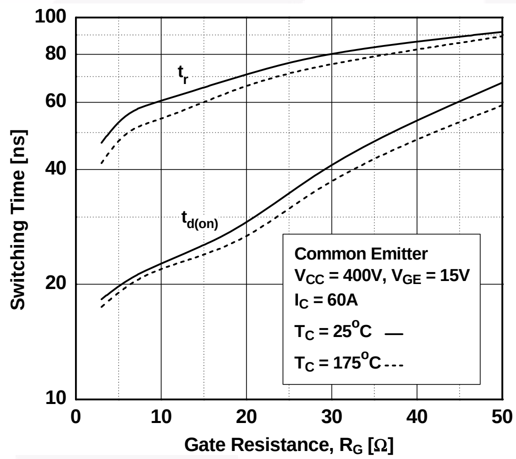


图 10. 关断特性与栅极电阻的关系

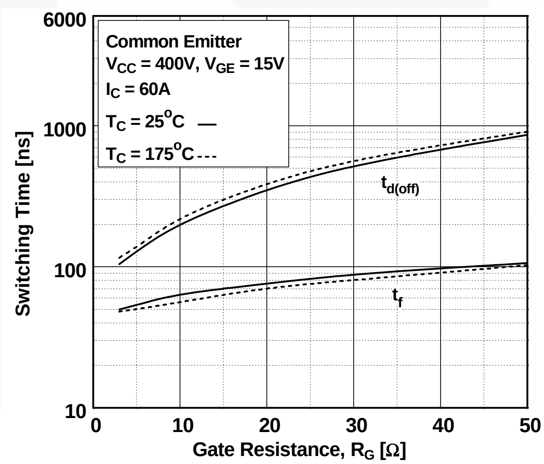


图 11. 开关损耗与栅极电阻的关系

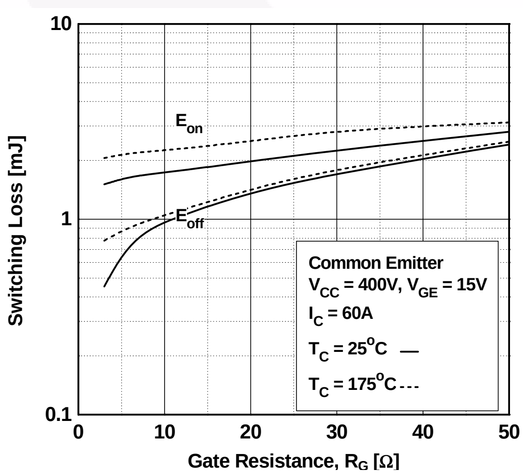
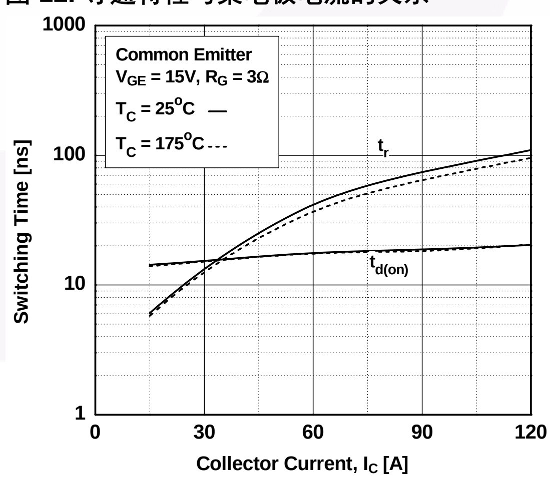


图 12. 导通特性与集电极电流的关系



典型性能特征

图 13. 关断特性与集电极电流的关系

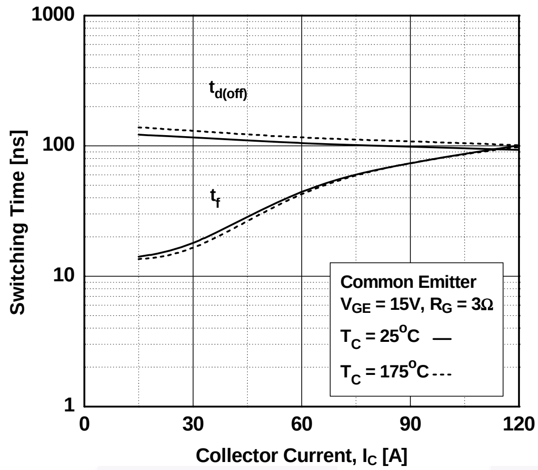


图 14. 开关损耗与集电极电流的关系

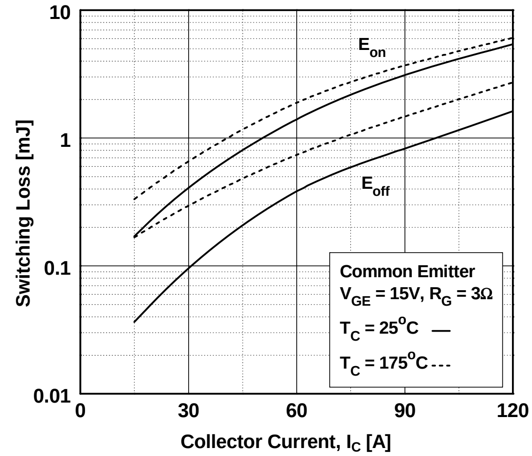


图 15. 负载电流与频率的关系

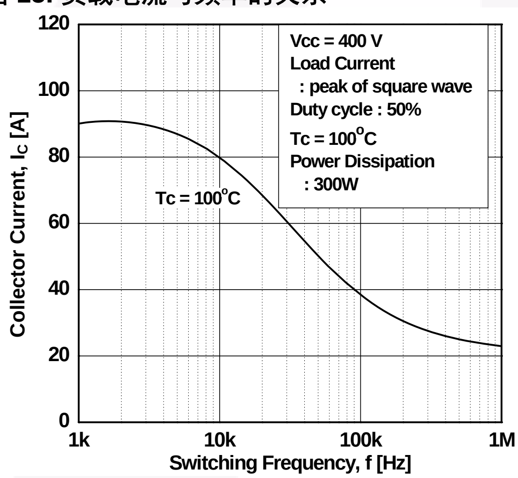


图 16. SOA 特性

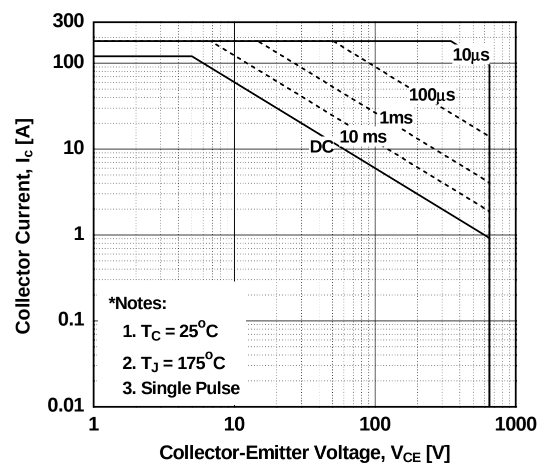


图 17. 正向特性

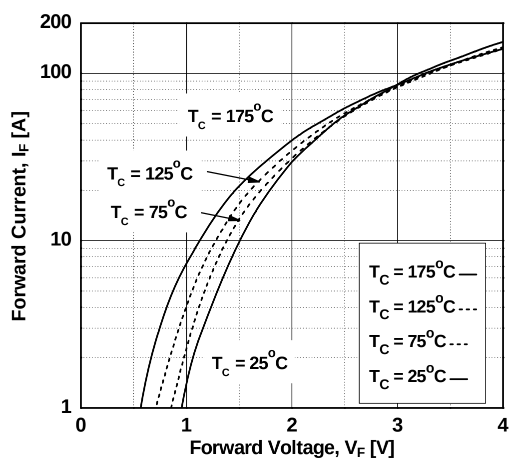
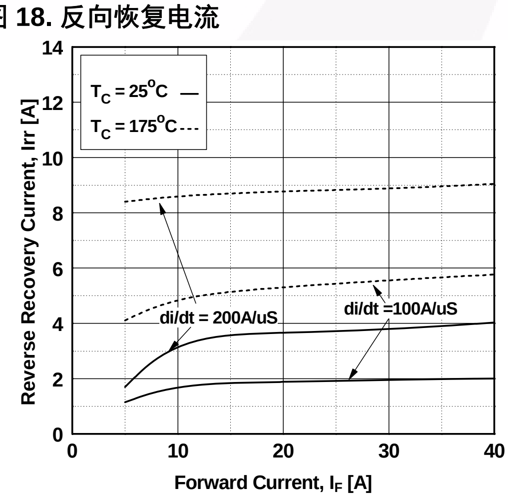


图 18. 反向恢复电流



典型性能特征

图 19. 反向恢复时间

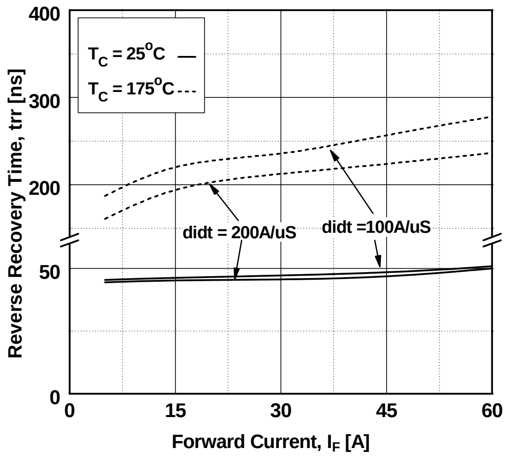


图 20. 存储电荷

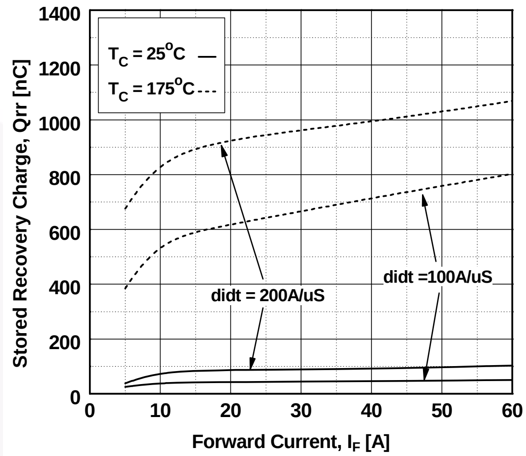


图 21. IGBT 的瞬态热阻

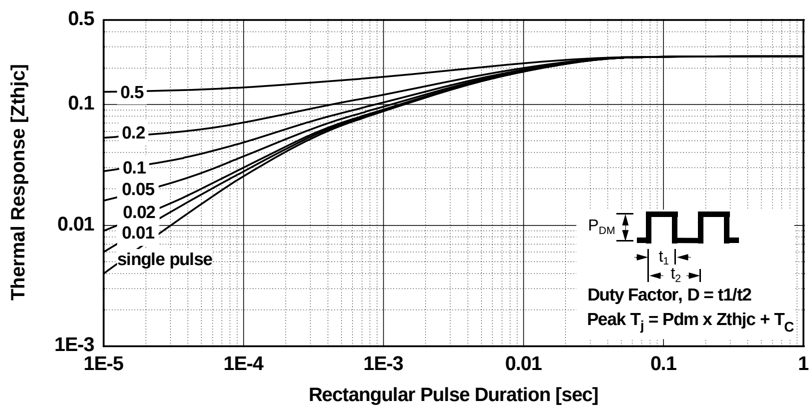
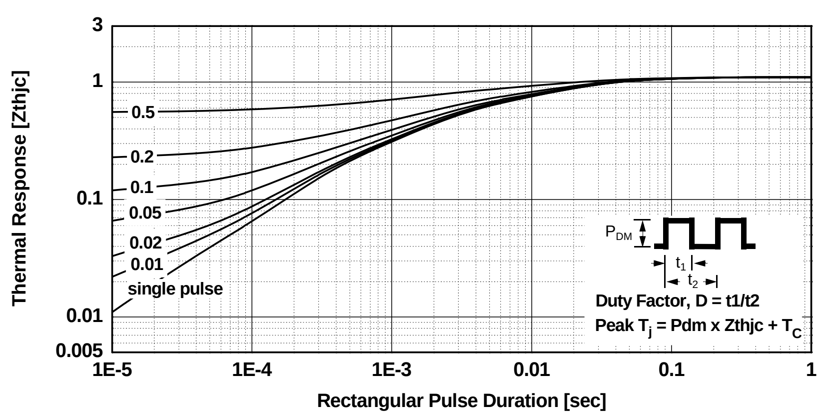


图 22. 二极管瞬态热阻抗



机械尺寸

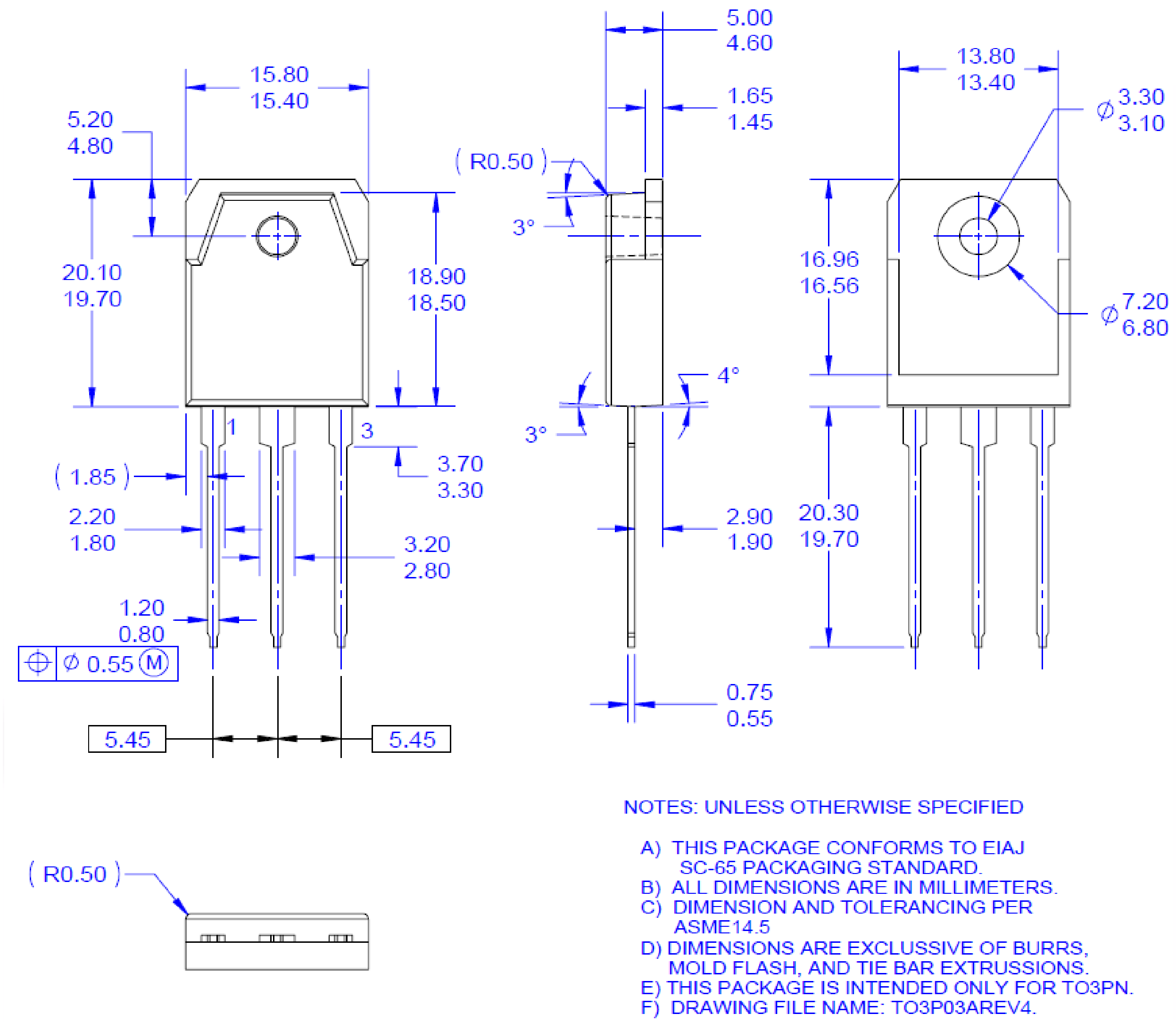


图 20. TO-3P 3L - 3LD, T03, PLASTIC, EIAJ SC-65

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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.
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