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2015 年 3 月

FGH40T65SHD

650 V, 40 A 场截止沟道 IGBT

特性

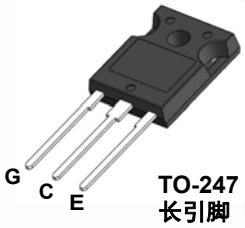
- 最大结温：T_J =175°C
- 正温度系数，易于并联运行
- 高电流能力
- 低饱和电压：$V_{CE(sat)}$ =1.6 V(典型值)@ I_C = 40 A
- 器件 100% 经过 I_{LM}(1) 测试
- 高输入阻抗
- 快速开关
- 紧密的参数分布
- 符合 RoHS 标准

概述

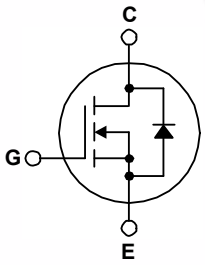
Fairchild 场截止第三代 IGBT 新系列采用创新型场截止 IGBT 技术，为光伏逆变器、UPS、焊机、通讯、ESS 和 PFC 等低导通和开关损耗至关重要的应用提供最佳性能。

应用

- 太阳能逆变器、 UPS、电焊机、电信、 ESS 、 PFC



TO-247
长引脚



绝对最大额定值 T_C = 25°C 除非另有说明

符号	描述		FGH40T65SHD_F155	单位
V_{CES}	集电极－发射极之间电压		650	V
VGES	栅极－发射极间电压		± 20	A
	瞬态栅极－发射极间电压		± 30	A
I_C	集电极电流	@ T_C = 25°C	80	A
	集电极电流	@ T_C = 100°C	40	A
$I_{LM\ (1)}$	集电极脉冲电流	@ T_C = 25°C	120	A
$I_{CM\ (2)}$	集电极脉冲电流		120	A
I_F	二极管正向电流	@ T_C = 25°C	40	A
	二极管正向电流	@ T_C = 100°C	20	A
$I_{FM\ (2)}$	二极管最大正向脉冲电流		120	A
P_D	最大功耗	@ T_C = 25°C	268	W
	最大功耗	@ T_C = 100°C	134	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：
1. V_{CC} = 400 V, V_{GE} = 15 V, I_C =120 A, R_G = 30 W, 感性负载
2. 重复额定值：脉宽受最大结温限制

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热性能

符号	参数	FGH40T65SHD_F155	单位
$R_{\theta JC}$(IGBT)	结至外壳热阻最大值	0.56	°C/W
$R_{\theta JC}$(Diode)	结至外壳热阻最大值	1.71	°C/W
$R_{\theta JA}$	结至环境热阻最大值	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	每管数量
FGH40T65SHD_F155	FGH40T65SHD	TO-247 G03	塑料管	-	-	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} = 0V, I_C = 1 mA	650	-	-	V
ΔBV_{CES} / ΔT_J	击穿电压温度系数电压	I_C = 1 mA, 参考 25°C 数值	-	0.5	-	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 = 40 mA, V_{CE} = V_{GE}	3.5	5.54	7.7	V
$V_{CE(sat)}$	集电极－发射极间饱和电压	I_C = 40 A, V_{GE} = 15 V	-	1.6	2.1	V
		I_C = 40 A, V_{GE} = 15 V, T_C = 175°C	-	2.14	-	V
动态特性						
C_{ies}	输入电容	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	-	1995	-	pF
C_{oes}	输出电容		-	70	-	pF
C_{res}	反向传输电容		-	23	-	pF
开关特性						
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 40 A, R_G = 6 Ω, V_{GE} = 15 V, 感性负载， T_C = 25°C	-	19.2	-	ns
t_r	上升时间		-	34.4	-	ns
$t_{d(off)}$	关断延迟时间		-	65.6	-	ns
t_f	下降时间		-	9.6	-	ns
E_{on}	导通开关损耗		-	1010	-	uJ
E_{off}	关断开关损耗		-	297	-	uJ
E_{ts}	总开关损耗		-	1307	-	uJ
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 40 A, R_G = 6 Ω, V_{GE} = 15 V, 感性负载， T_C = 175°C	-	18.4	-	ns
t_r	上升时间		-	32.8	-	ns
$t_{d(off)}$	关断延迟时间		-	71.2	-	ns
t_f	下降时间		-	14.4	-	ns
E_{on}	导通开关损耗		-	1390	-	uJ
E_{off}	关断开关损耗		-	541	-	uJ
E_{ts}	总开关损耗		-	1931	-	uJ

IGBT 电气特性 （接上页）

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 = 40 A, V_{GE} = 15 V	-	72.2	-	nC
Q_{ge}	栅极－发射极间电荷		-	13.5	-	nC
Q_{gc}	栅极－集电极间电荷		-	28.5	-	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 = 20 A	T_C = 25°C	-	2.2	2.8	V
			T_C = 175°C	-	1.94	-	
E_{rec}	反向恢复电能	I_F =20 A, dI_F/dt = 200 A/μs	T_C = 175°C	-	50	-	uJ
t_{rr}	二极管反向恢复时间		T_C = 25°C	-	31.8	-	ns
			T_C = 175°C	-	192	-	
Q_{rr}	二极管反向恢复电荷		T_C = 25°C	-	50.6	-	nC
			T_C = 175°C	-	699	-	

典型性能特征

图 1. 典型输出特性

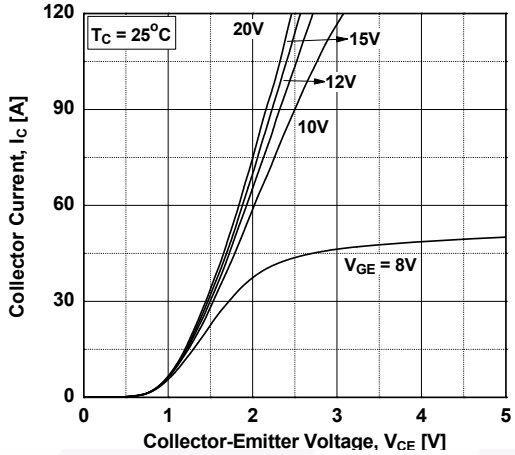


图 2. 典型输出特性

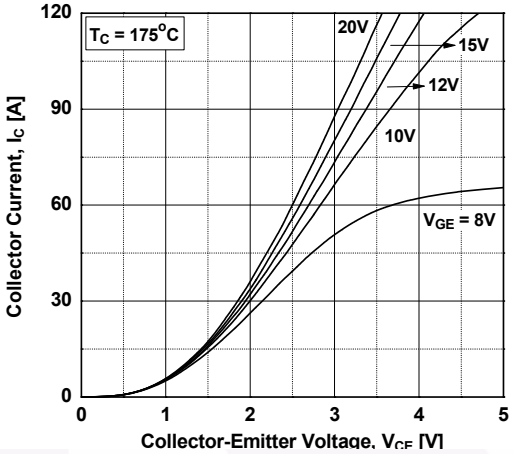


图 3. 典型饱和电压特性

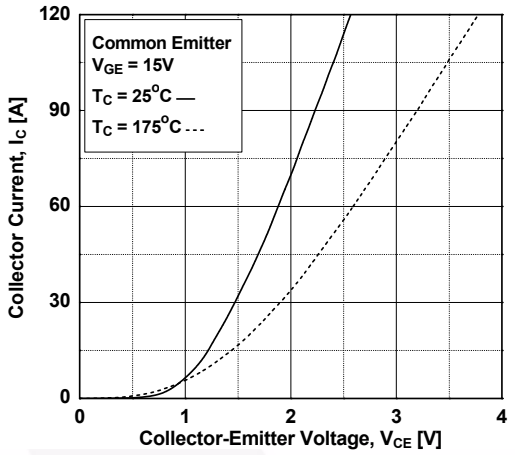


图 4. 饱和电压与可变电流强度下壳温的关系

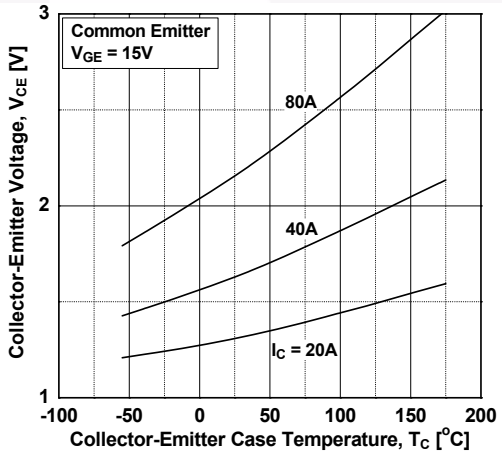


图 5. 饱和电压与 V_{GE} 的关系

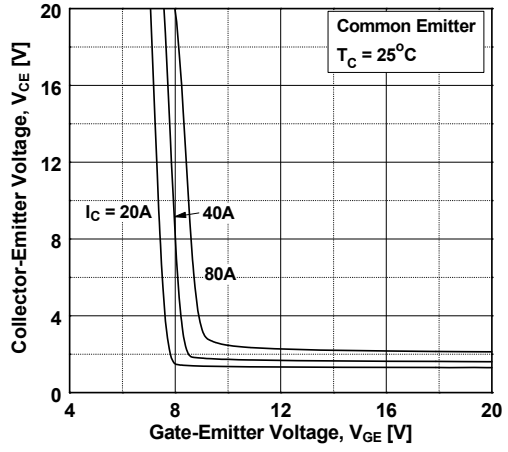
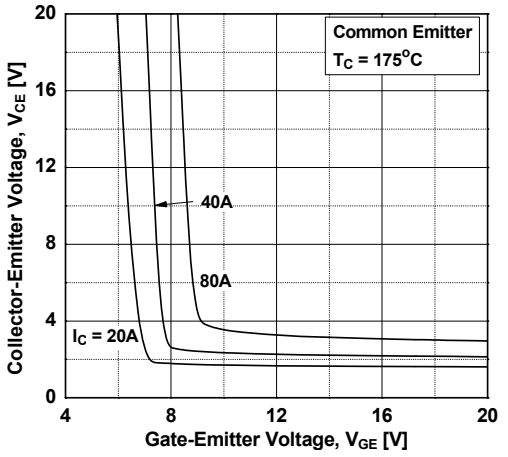


图 6. 饱和电压与 V_{GE} 的关系



典型性能特征

图 7. 电容特性

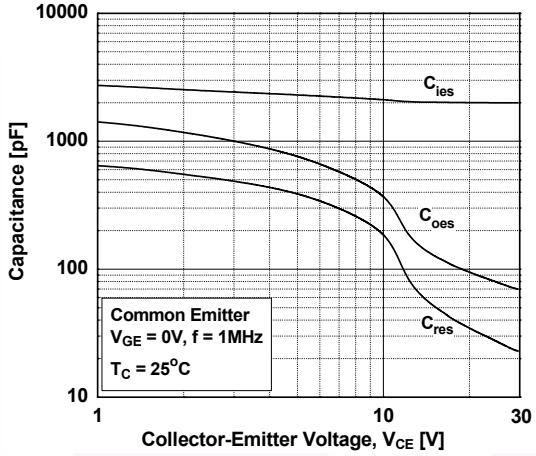


图 8. 栅极电荷特性

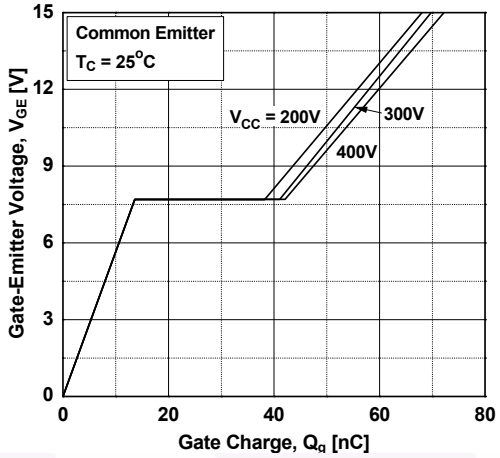


图 9. 导通特性与栅极电阻的关系

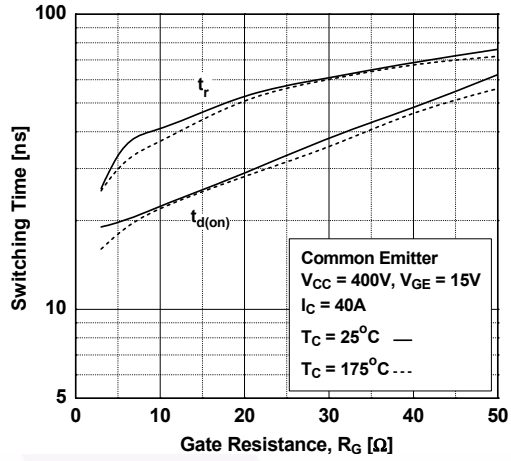


图 10. 关断特性与栅极电阻的关系

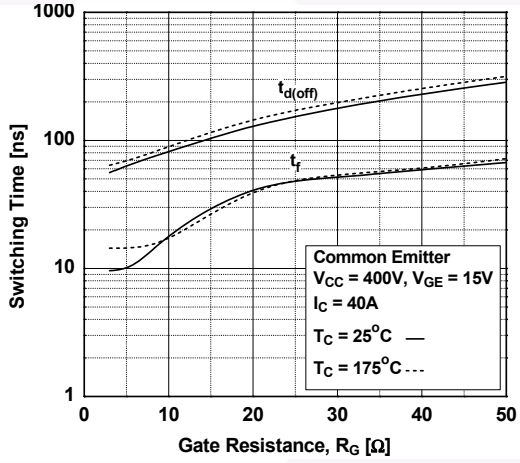


图 11. 开关损耗与栅极电阻的关系

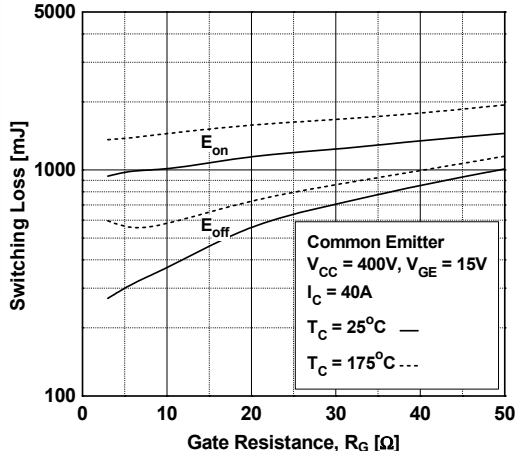
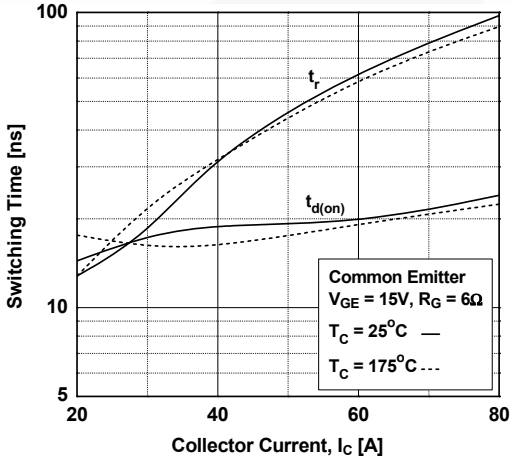


图 12. 导通特性与集电极电流的关系



典型性能特征

图 13. 关断特性与集电极电流的关系

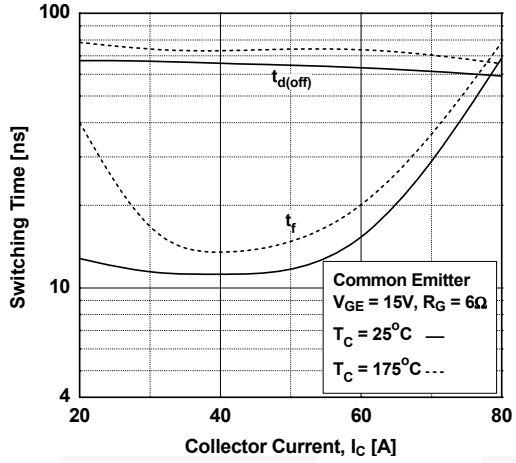


图 14. 开关损耗与集电极电流的关系

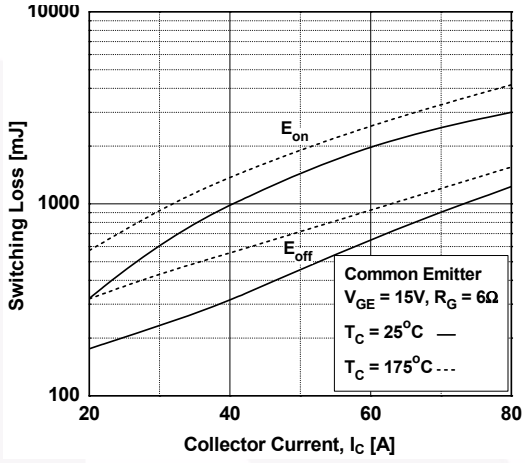


图 15. 负载电流与频率的关系

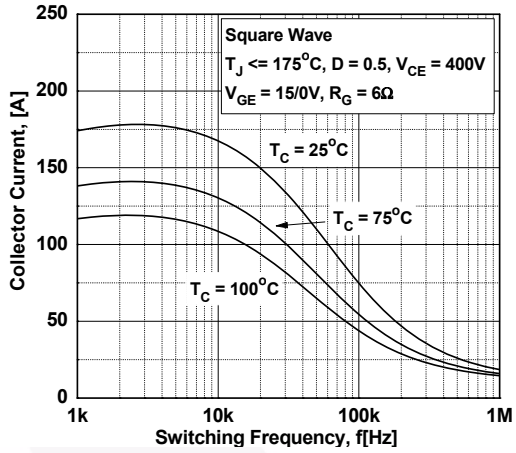


图 16. SOA 特性

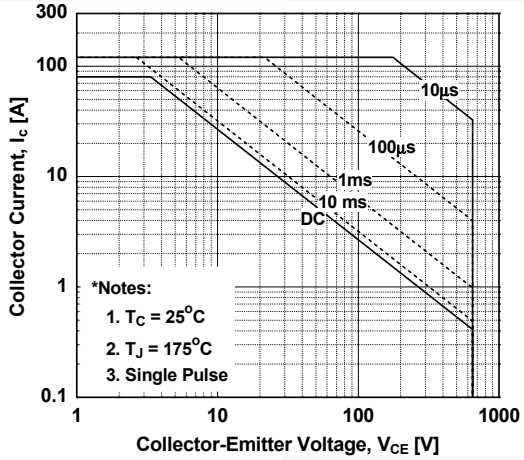


图 17. 正向特性

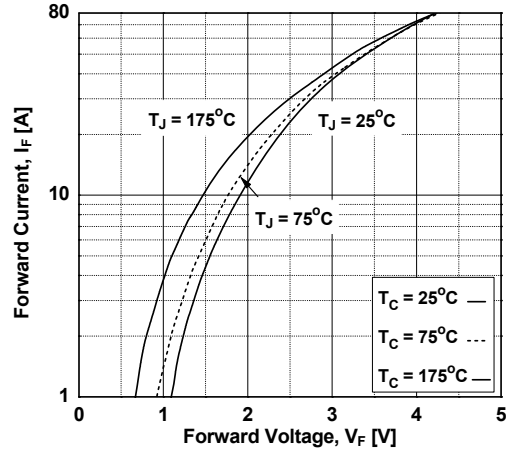
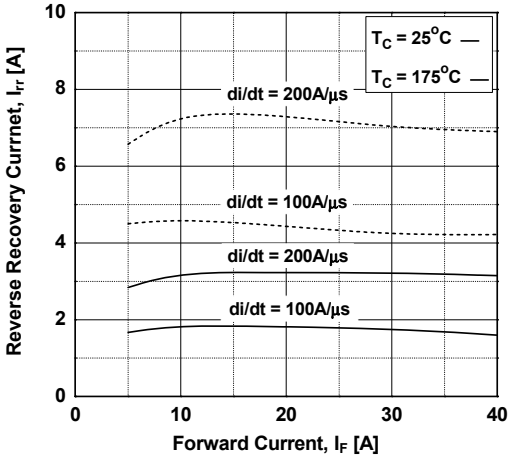


图 18. 反向恢复电流



典型性能特征

图 19. 反向恢复时间

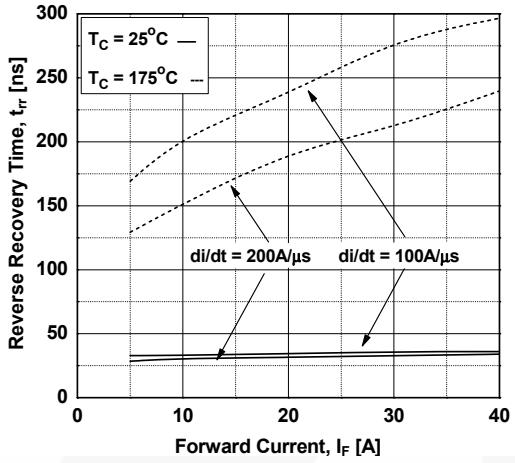


图 20. 存储电荷

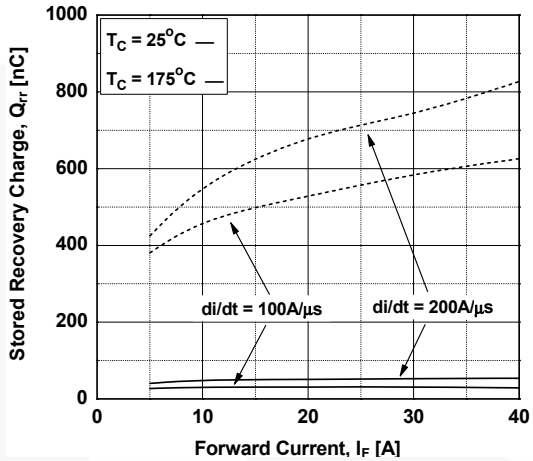


图 21. IGBT 的瞬态热阻

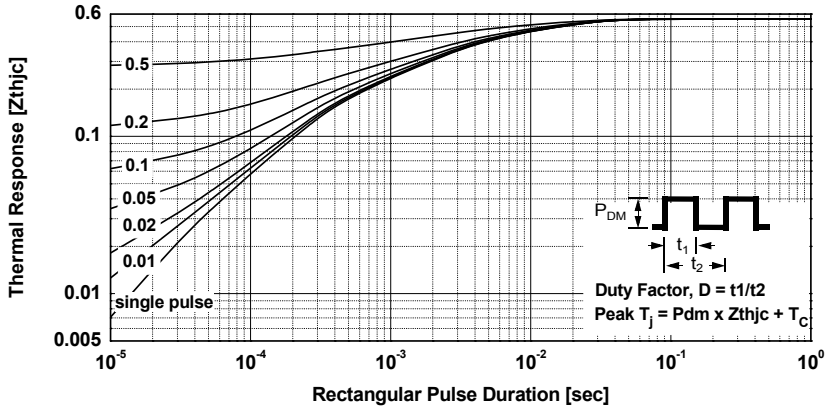
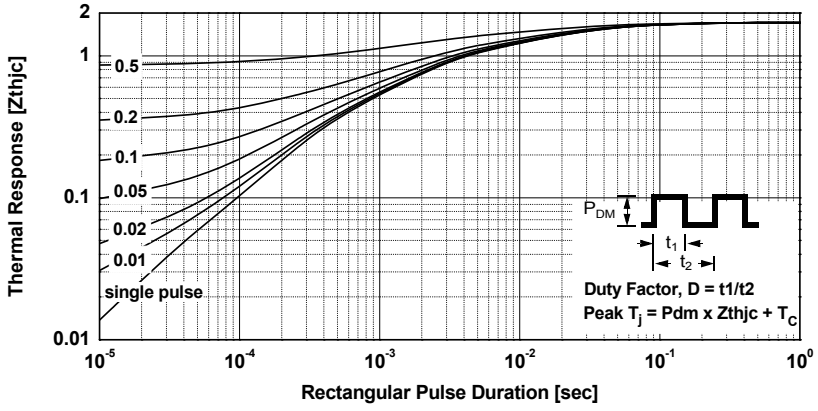


图 22. 二极管瞬态热阻抗



机械尺寸

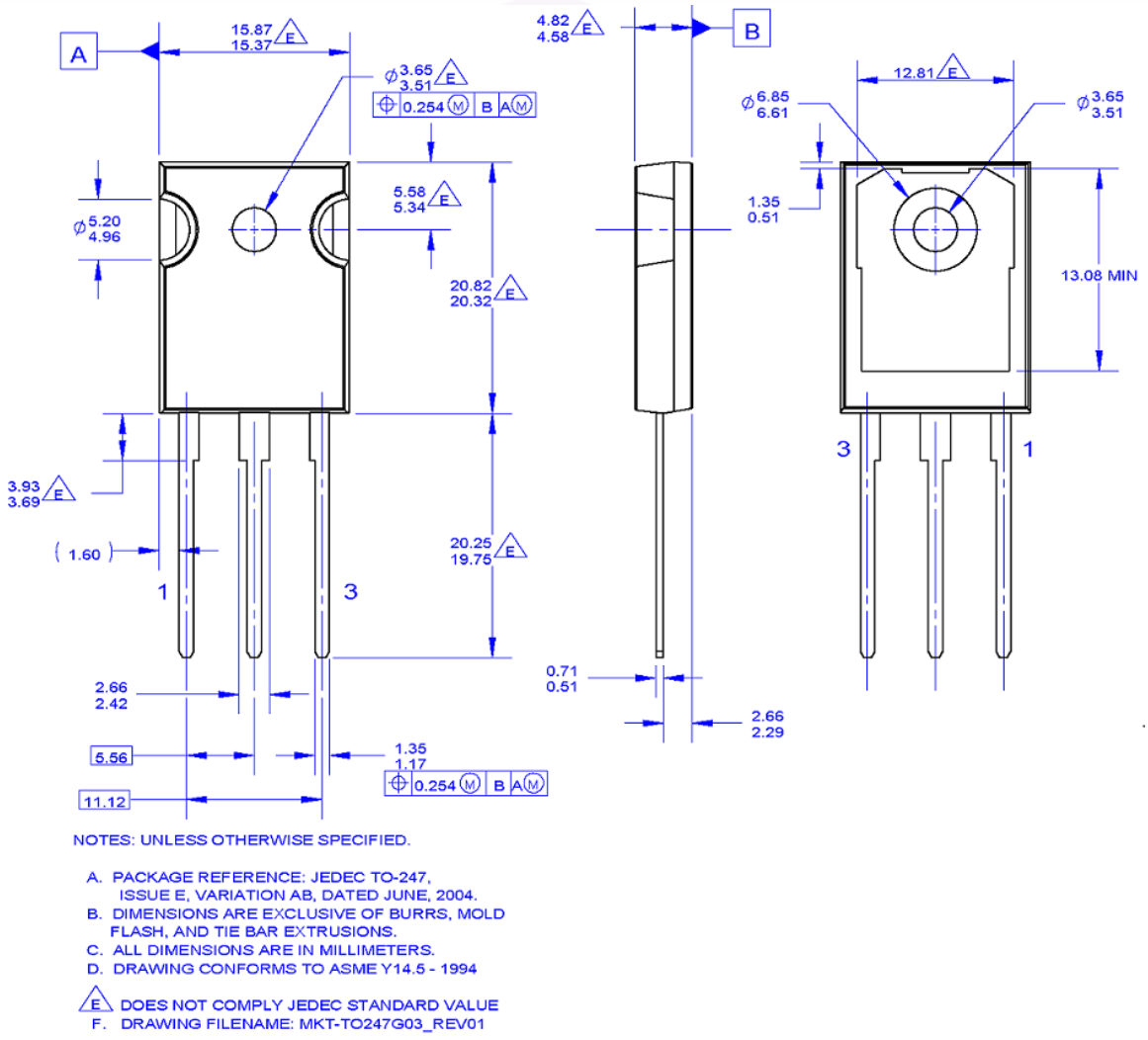


图 23. TO-247 3L - TO-247，模塑封装， 3 引脚， JEDEC AB 长引脚

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Definition of Terms

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