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2014 年 9 月

FGH40T65SHDF

650 V、 40 A 场截止沟槽 IGBT

特性

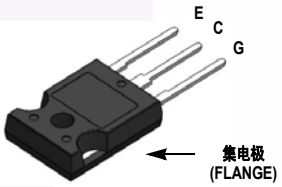
- 最大结温：T_J =175°C
- 正温度系数，易于并联运行
- 高电流能力
- 低饱和电压：$V_{CE(sat)}$ = 1.45 V （典型值） @ I_C = 40 A
- 器件 100% 经过 I_{LM}(1) 测试
- 高输入阻抗
- 快速开关
- 紧密的参数分布
- 符合 RoHS 标准

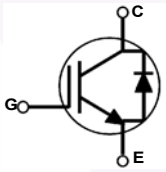
概述

飞兆半导体新型场截止第三代 IGBT 采用创新型的场截止 IGBT 技术，可以提供优越的导通和开关性能，并且易于并联运行。该设备非常适合谐振或软开关应用，例如感应加热、微波炉等。

应用

- 感应加热、微波炉





绝对最大额定值

符号	描述		FGH40T65SHDF_F155	单位
V_{CES}	集电极－发射极之间电压		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	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}	二极管最大正向脉冲电流		60	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 Ω, 感性负载
2. 重复额定值：脉宽受最大结温限制

热性能

符号	参数	FGH40T65SHDF_F155	单位
$R_{\theta JC}$ (IGBT)	结至外壳热阻最大值	0.56	°C/W
$R_{\theta JC}$（二极管）	结至外壳热阻最大值	1.75	°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

器件标识	器件	封装	卷尺寸	带宽	每管数量
FGH40T65SHDF	FGH40T65SHDF_F155	TO-247 G03	-	-	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 = 1 mA	650	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	击穿电压温度系数电压	V_{GE} = 0 V, I_C = 1 mA	-	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 = 40 mA, V_{CE} = V_{GE}	3.5	5.5	7.5	V
$V_{CE(sat)}$	集电极 - 发射极间饱和电压	I_C = 40 A, V_{GE} = 15 V	-	1.45	1.81	V
		I_C = 40 A, V_{GE} = 15 V, T_C = 175°C	-	1.8	-	V
动态特性						
C_{ies}	输入电容	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	-	1982	-	pF
C_{oes}	输出电容		-	70	-	pF
C_{res}	反向传输电容		-	25	-	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	-	18	-	ns
T_r	上升时间		-	27	-	ns
$T_{d(off)}$	关断延迟时间		-	64	-	ns
T_f	下降时间		-	3	-	ns
E_{on}	导通开关损耗		-	1.22	-	mJ
E_{off}	关断开关损耗		-	0.44	-	mJ
E_{ts}	总开关损耗		-	1.66	-	mJ
$T_{d(on)}$	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	-	ns
T_r	上升时间		-	31	-	ns
$T_{d(off)}$	关断延迟时间		-	70	-	ns
T_f	下降时间		-	56	-	ns
E_{on}	导通开关损耗		-	1.78	-	mJ
E_{off}	关断开关损耗		-	0.78	-	mJ
E_{ts}	总开关损耗		-	2.56	-	mJ

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	-	68	-	nC
Q_{ge}	栅极－发射极间电荷		-	12	-	nC
Q_{gc}	栅极－集电极间电荷		-	25	-	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	-	1.5	1.95	V
			T_C = 175°C	-	1.37	-	
E_{rec}	反向恢复电能	I_F = 20 A, dI_F/dt = 200 A/μs	T_C = 175°C	-	153	-	μJ
T_{rr}	二极管反向恢复时间		T_C = 25°C	-	101	-	ns
			T_C = 175°C	-	238	-	
Q_{rr}	二极管反向恢复电荷		T_C = 25°C	-	343	-	nC
			T_C = 175°C	-	1493	-	

典型性能特征

图 1. 典型输出特性

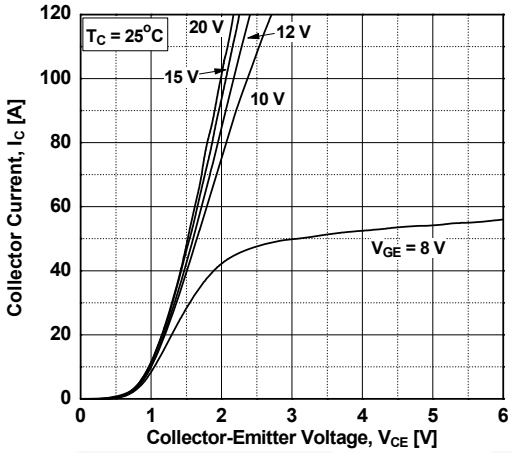


图 2. 典型输出特性

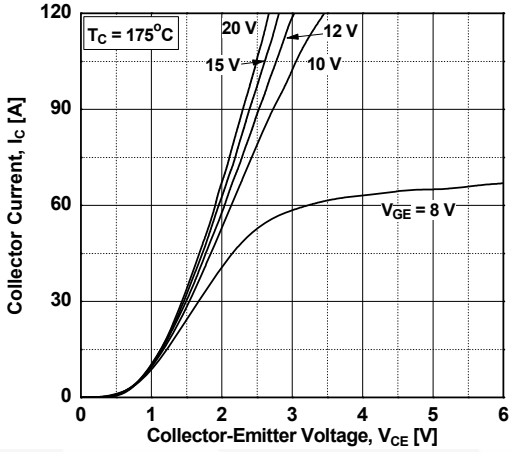


图 3. 典型饱和电压特性

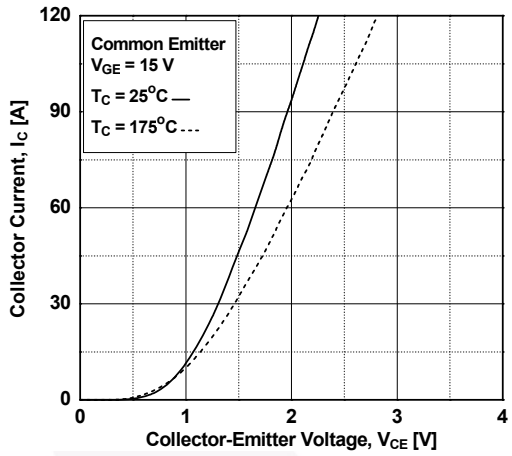


图 4. 饱和电压与可变电流强度下壳温的关系

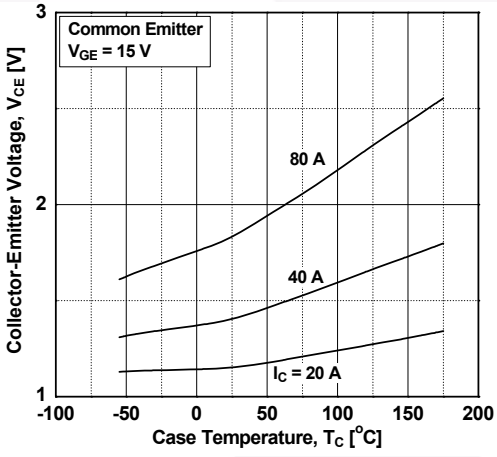


图 5. 饱和电压与 V_{GE} 的关系

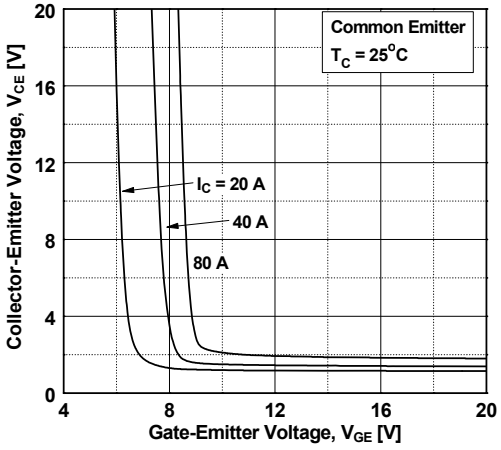
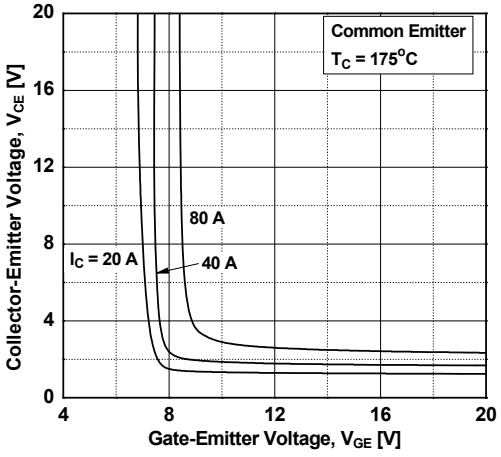


图 6. 饱和电压与 V_{GE} 的关系



典型性能特征

图 7. 电容特性

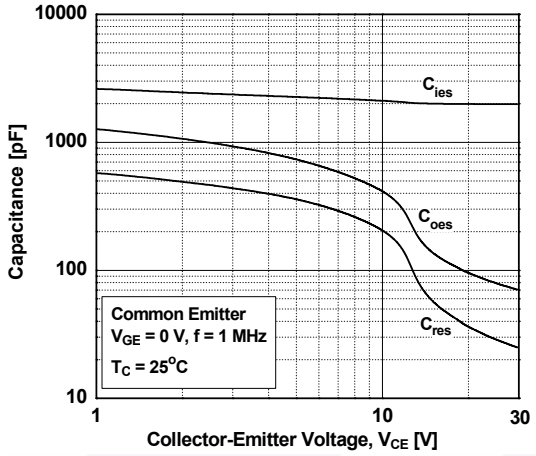


图 8. 栅极电荷特性

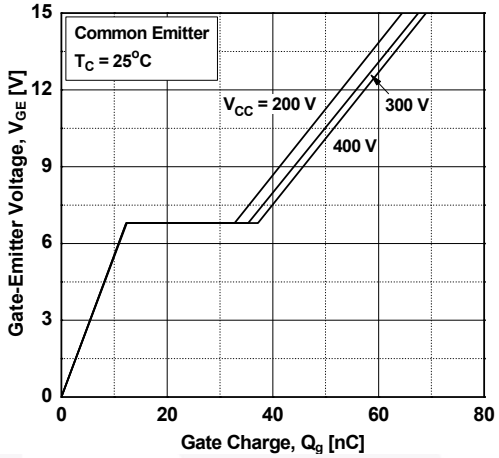


图 9. 导通特性与栅极电阻的关系

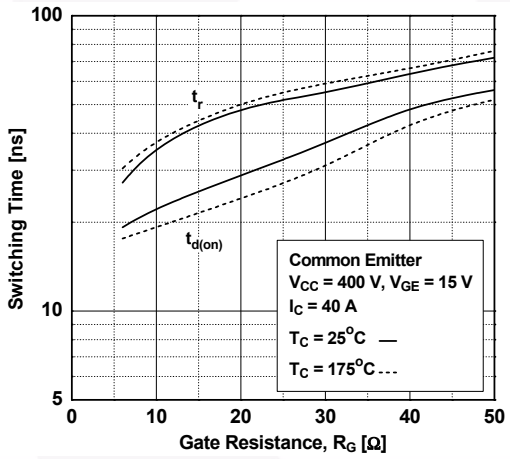


图 10. 关断特性与栅极电阻的关系

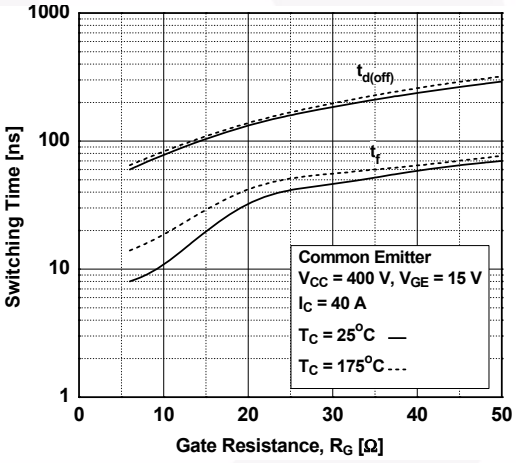


图 11. 开关损耗与栅极电阻的关系

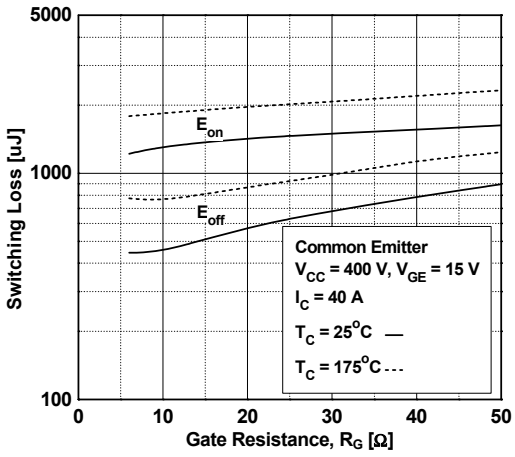
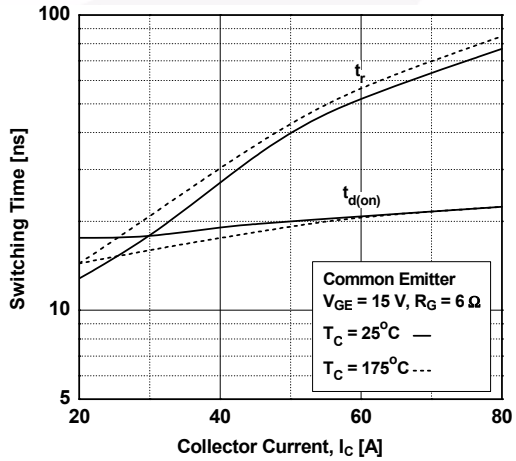


图 12. 导通特性与集电极电流的关系



典型性能特征

图 13. 关断特性与集电极电流的关系

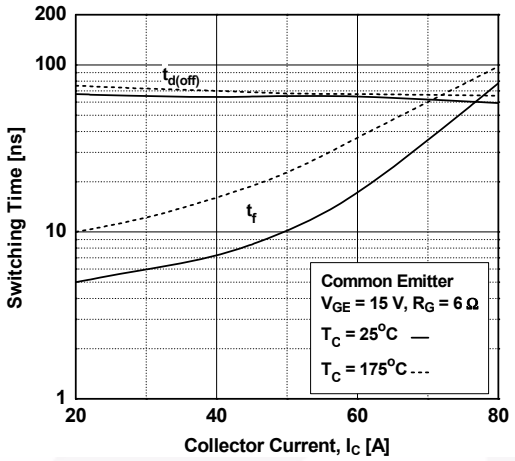


图 14. 开关损耗与集电极电流的关系

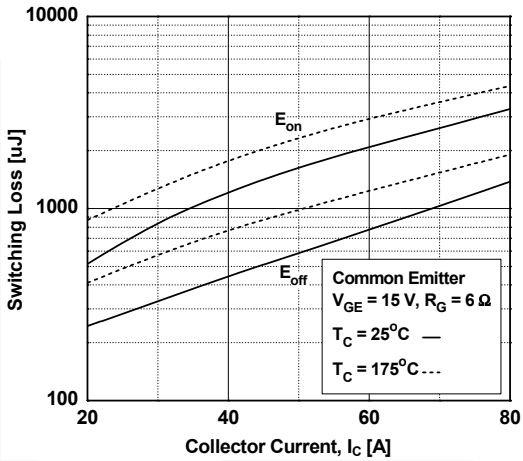


图 15. 负载电流与频率的关系

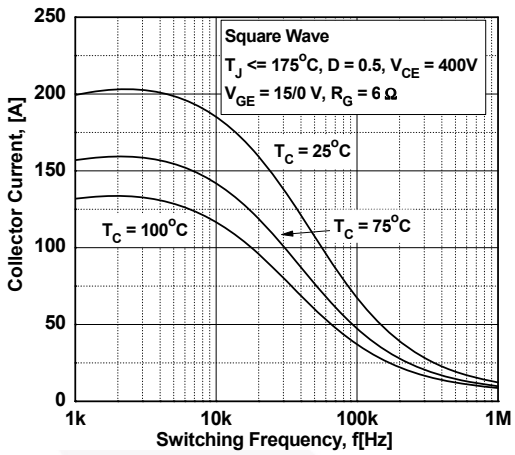


图 16. SOA 特性

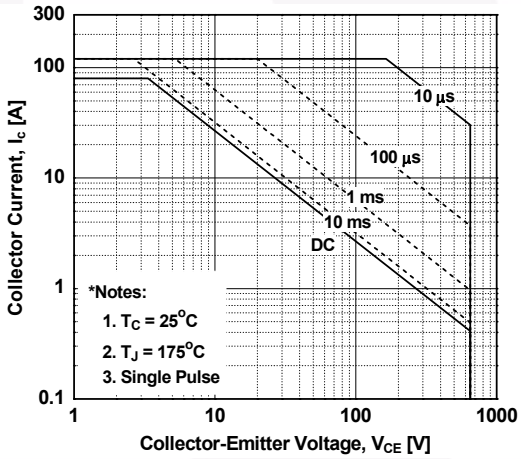


图 17. 正向特性

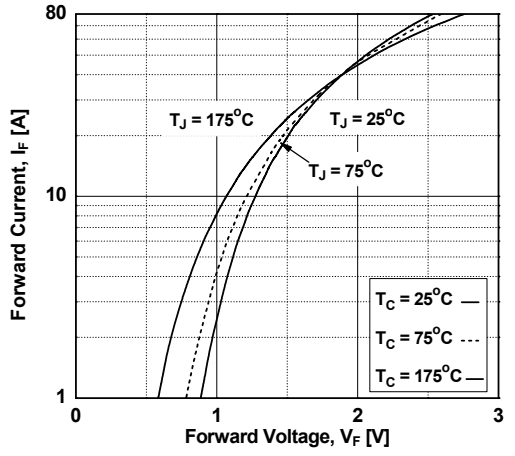
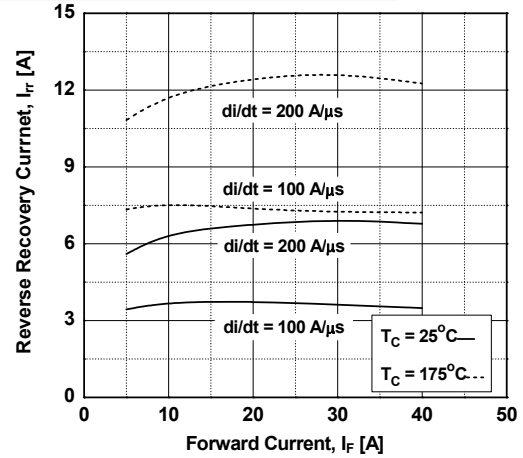


图 18. 反向恢复电流



典型性能特征

图 19. 反向恢复时间

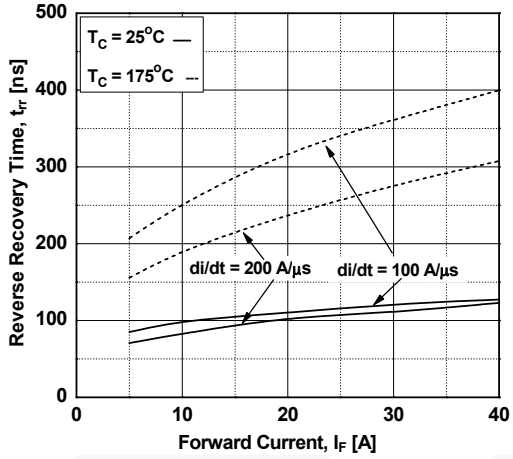


图 20. 存储电荷

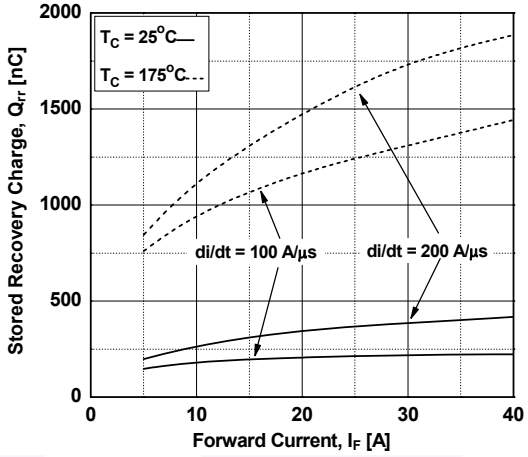


图 21. IGBT 瞬态热阻抗

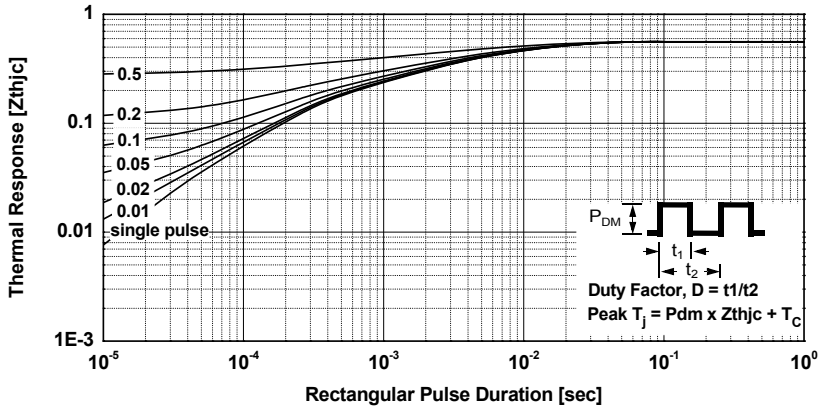
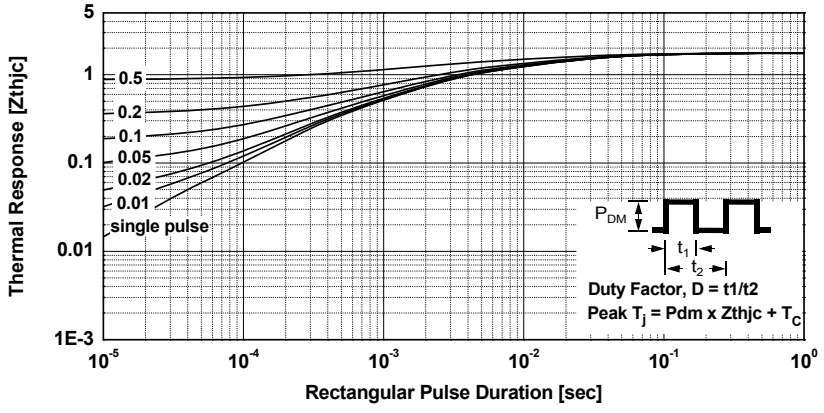


图 22. 二极管瞬态热阻抗



机械尺寸

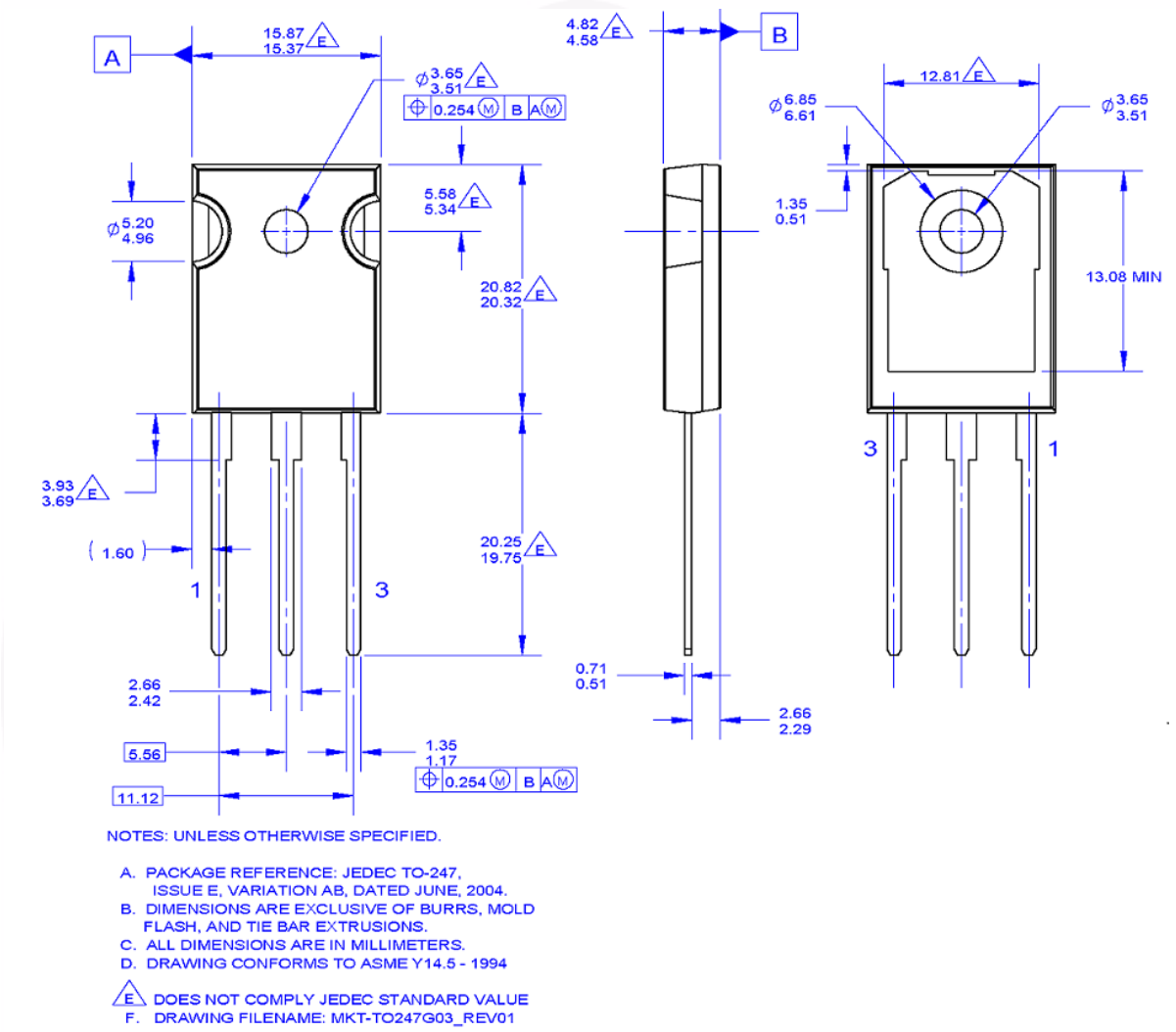


图 23. TO-247 3L - TO-247，模塑封装， 3 引脚， JEDEC AB 长引脚

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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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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.
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