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ON Semiconductor®

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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD SEMICONDUCTOR®

2013 年 12 月

FGH40T65UPD

650 V, 40 A 场截止沟道 IGBT

特性

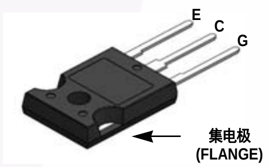
- 最大结温：$T_J = 175^{\circ}C$
- 正温度系数，易于并联运行
- 高电流能力
- 低饱和电压：$V_{CE(sat)} = 1.65$ V (Typ.) @ $I_C = 40$ A
- 器件 100% 经过 $I_{LM(2)}$ 测试
- 高输入阻抗
- 紧密的参数分布
- 符合 RoHS 标准
- 短路耐用性 > 5 μs @25°C

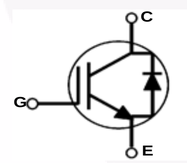
概述

飞兆半导体的新型场截止沟道 IGBT 系列产品采用创新型场截止沟道 IGBT 技术，为光伏逆变器、 UPS、焊机和数码发电机等低导通和开关损耗至关重要的应用提供了最佳性能。

应用

- 光伏逆变器、 UPS、焊机、数码发电机
- 通信电源、 ESS





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		± 25	V
I_C	集电极电流	@ $T_C = 25^{\circ}C$	80	A
	集电极电流	@ $T_C = 100^{\circ}C$	40	A
$I_{CM\ (1)}$	集电极脉冲电流		120	A
$I_{LM\ (2)}$	箝位感性负载电流	@ $T_C = 25^{\circ}C$	120	A
I_F	二极管正向电流	@ $T_C = 25^{\circ}C$	40	A
	二极管正向电流	@ $T_C = 100^{\circ}C$	20	A
$I_{FM(1)}$	二极管最大正向脉冲电流		120	A
P_D	最大功耗	@ $T_C = 25^{\circ}C$	268	W
	最大功耗	@ $T_C = 100^{\circ}C$	134	W
SCWT	短路耐受时间	@ $T_C = 25^{\circ}C$	5	μs
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
2: Ic = 120 A, Vce = 400 V, Rg = 15 Ω

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		0.56	°C/W
$R_{\theta JC}$(Diode)	结点－壳体的热阻		1.71	°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
FGH40T65UPD	FGH40T65UPD	TO-247 A03	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 = 1 mA	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		0.65		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, $V_{CE} = V_{GE}$	4.0	6.0	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		1.65	2.3	V
		I_C = 40 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		2730	3630	pF
C_{oes}	输出电容			82	110	pF
C_{res}	反向传输电容			48	72	pF
开关特性						
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 40 A, R_G = 7 W, V_{GE} = 15 V, 感性负载， T_C = 25°C		20	26	ns
t_r	上升时间			26	34	ns
$t_{d(off)}$	关断延迟时间			144	187	ns
t_f	下降时间			17	22	ns
E_{on}	导通开关损耗			1.59	2.1	mJ
E_{off}	关断开关损耗			0.58	0.76	mJ
E_{ts}	总开关损耗			2.17	2.86	mJ
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 40 A, R_G = 7 Ω, V_{GE} = 15 V, 感性负载， T_C = 175°C		19		ns
t_r	上升时间			38		ns
$t_{d(off)}$	关断延迟时间			153		ns
t_f	下降时间			60		ns
E_{on}	导通开关损耗			1.84		mJ
E_{off}	关断开关损耗			0.98		mJ
E_{ts}	总开关损耗			2.82		mJ
T_{SC}	短路耐受时间	V_{GE} = 15 V, V_{CC} =400 V, R_G = 10 Ω	5			μs
Q_g	总栅极电荷	V_{CE} = 400 V, I_C = 40 A, V_{GE} = 15 V		177	265	nC
Q_{ge}	栅极－发射极间电荷			23	35	nC
Q_{gc}	栅极－集电极间电荷			100	150	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		2.1	2.7	V
			T_C = 175°C		1.9		
E_{rec}	反向恢复电能	I_F = 20 A, di_F/dt = 200 A/ms	T_C = 175°C		96		µJ
t_{rr}	二极管反向恢复时间		T_C = 25°C		33	43	ns
			T_C = 175°C		128		
Q_{rr}	二极管反向恢复电荷		T_C = 25°C		53	74	nC
			T_C = 175°C		341		

典型性能特征

图 1. 典型输出特性

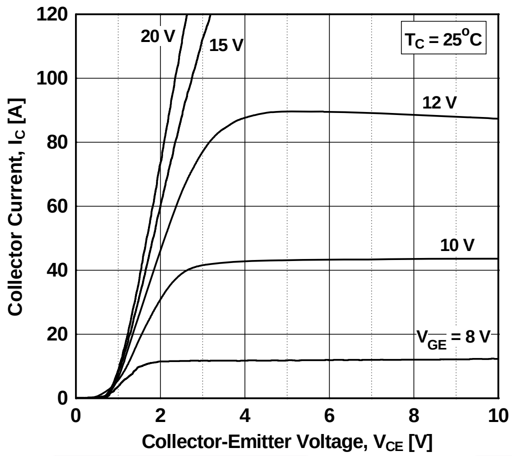


图 2. 典型输出特性

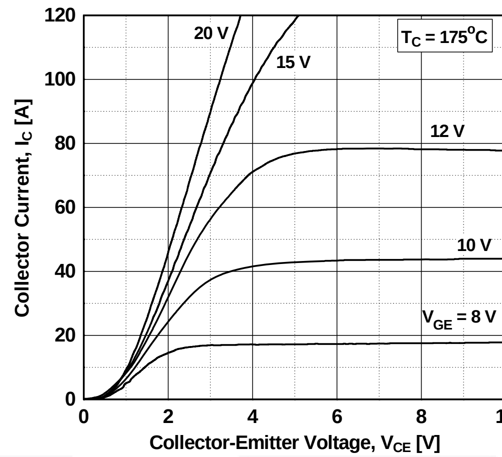


图 3. 饱和电压特性

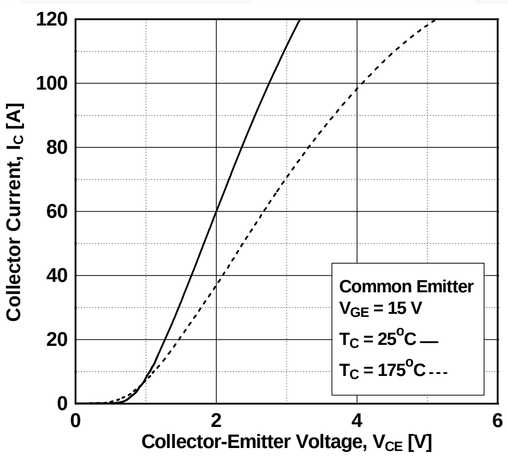


图 4. 饱和电压与可变电流强度下壳温的关系

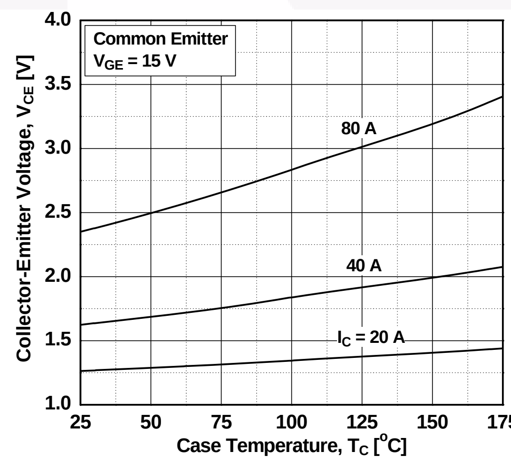


图 5. 饱和电压与 V_{GE} 的关系

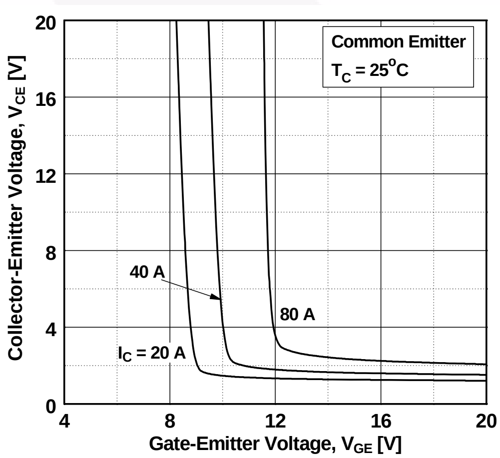
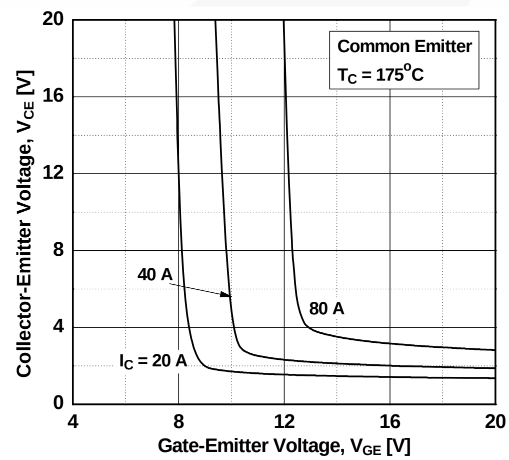


图 6. 饱和电压与 V_{GE} 的关系



典型性能特征

图 7. 电容特性

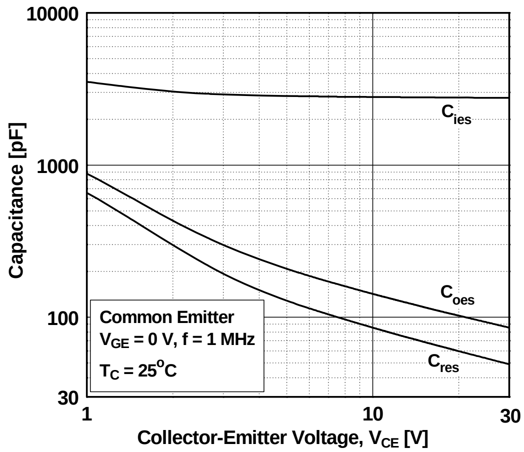


图 8. 栅极电荷特性

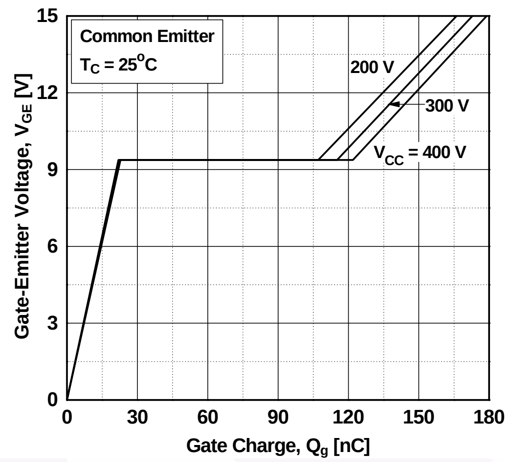


图 9. 导通特性与栅极电阻的关系

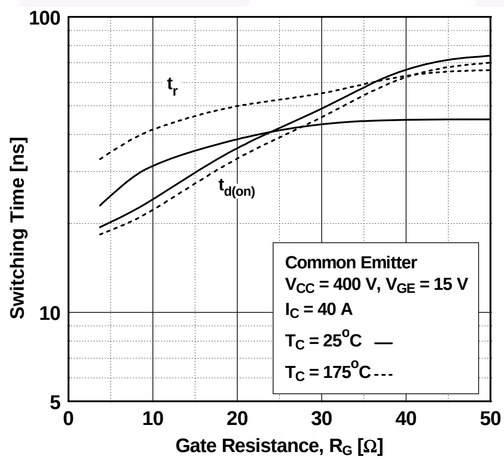


图 10. 关断特性与栅极电阻的关系

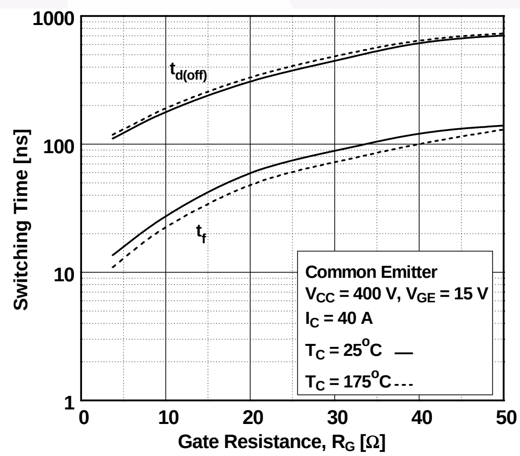


图 11. 开关损耗与栅极电阻的关系

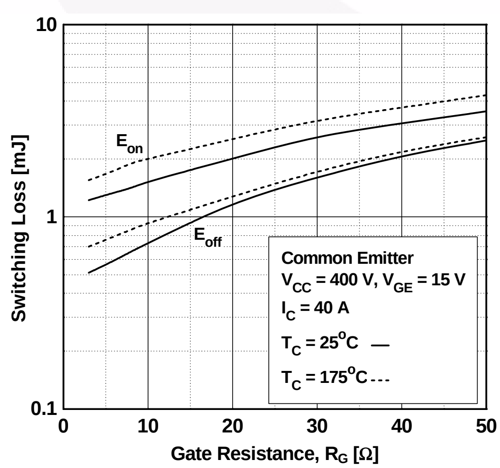
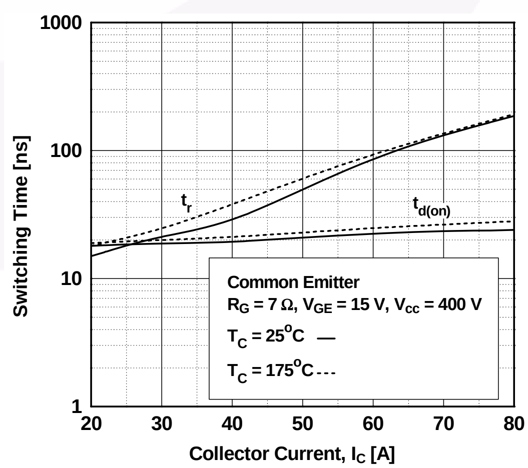


图 12. 导通特性与集电极电流的关系



典型性能特征

图 13. 关断特性与集电极电流的关系

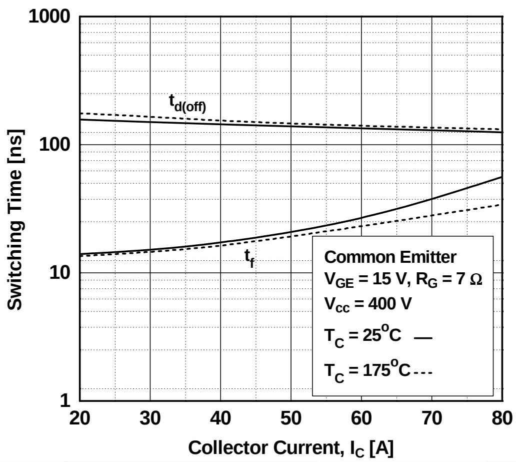


图 14. 开关损耗与集电极电流的关系

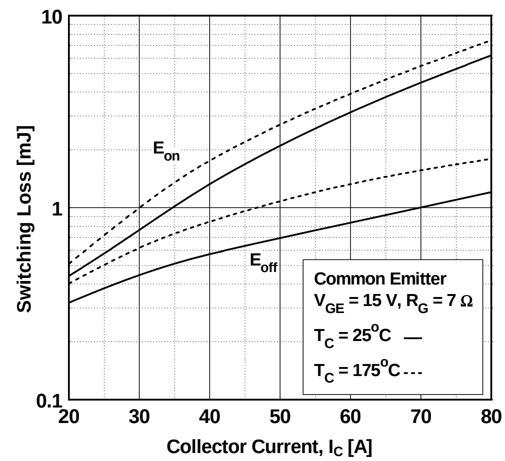


图 15. 负载电流与频率的关系

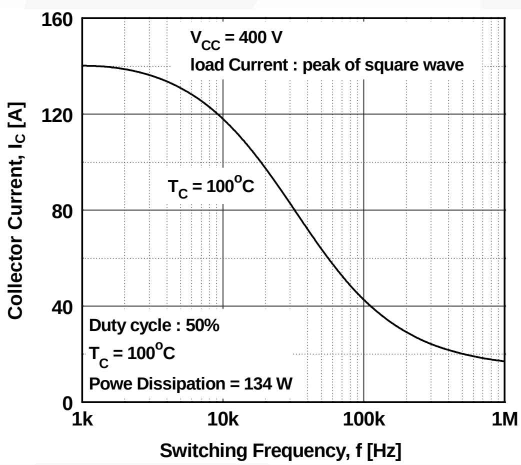


图 16. SOA 特性

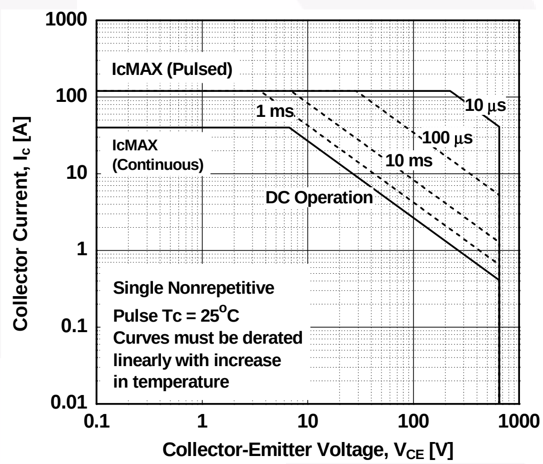


图 17. 正向特性

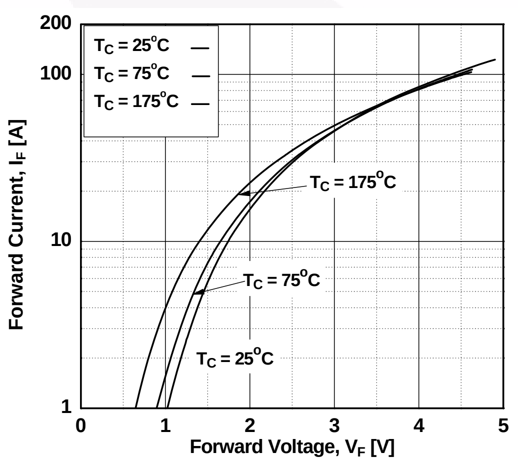
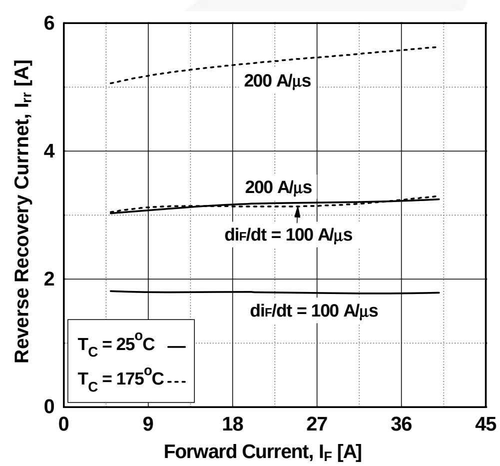


图 18. 反向恢复电流



典型性能特征

图 19. 反向恢复时间

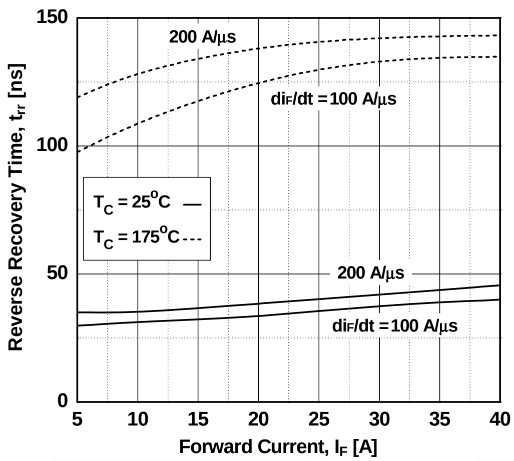


图 20. 存储电荷

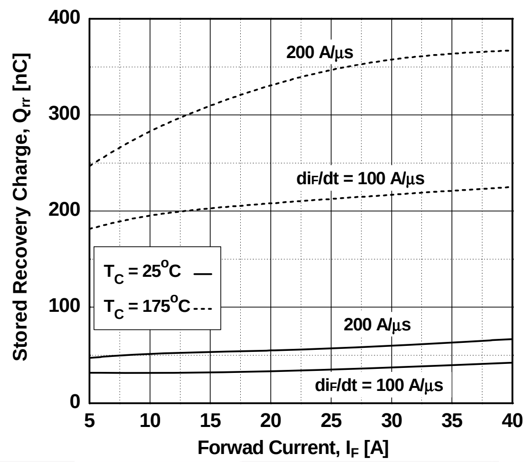


图 21. IGBT 瞬态热阻抗

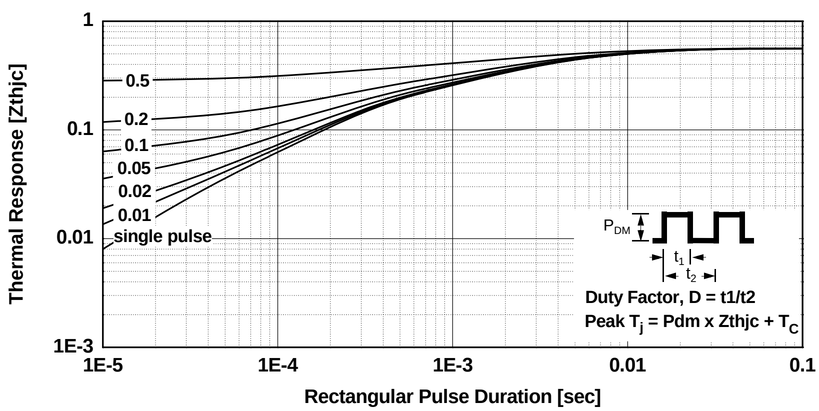
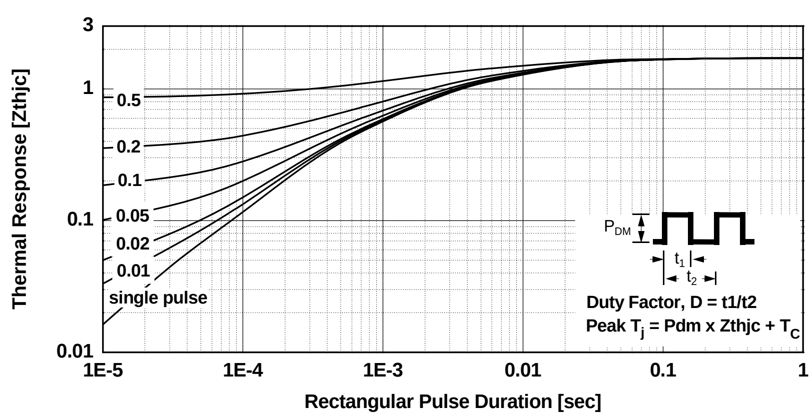


图 22. 二极管瞬态热阻抗



机械尺寸

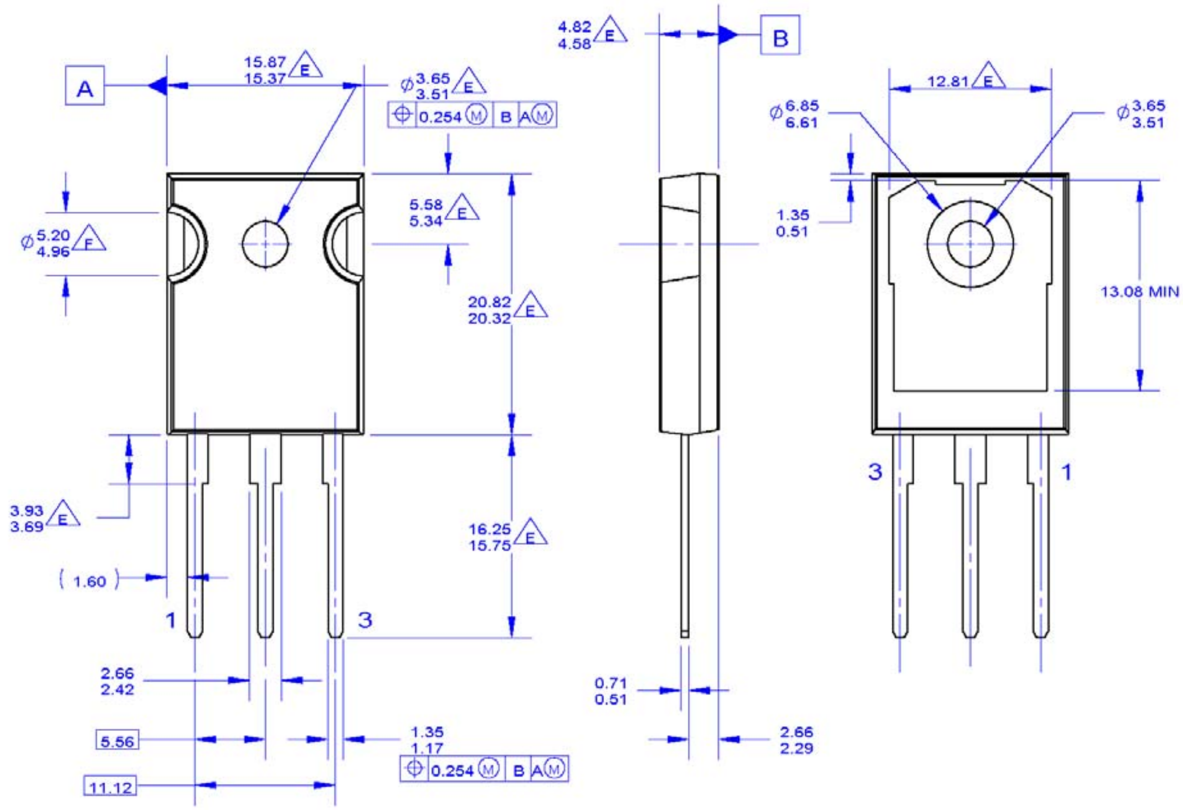


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图 23. TO-247, MOLDED, 3 LEAD, JEDEC VARIATION AB （有效）

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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.

Rev. I66

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