



ON Semiconductor®

# FGH15T120SMD

## 1200 V, 15 A 场截止沟道 IGBT

### 特性

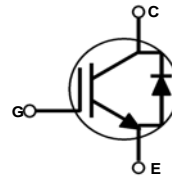
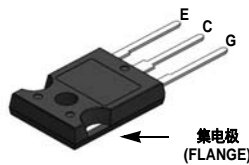
- FS 沟道技术, 正温度系数
- 高速开关
- 低饱和电压:  $V_{CE(sat)} = 1.8 \text{ V} @ I_C = 15 \text{ A}$
- $I_{LM}(1)$  部件 100% 检测
- 高输入阻抗
- 符合 RoHS 标准

### 概述

通过采用创新的场截止沟道 IGBT 技术, 飞兆半导体新型系列的场截止沟道 IGBT 可为光伏逆变器、UPS、焊机和 PFC 等硬开关应用提供最佳性能。

### 应用

- 光伏逆变器、焊机、UPS 和 PFC 应用



### 绝对最大额定值 $T_C = 25^\circ\text{C}$ 除非另有说明

符号	说明	额定值	单位
$V_{CES}$	集电极 - 发射极间电压	1200	V
$V_{GES}$	栅极 - 发射极间电压	$\pm 25$	V
	瞬态栅极 - 发射极间电压	$\pm 30$	V
$I_C$	集电极电流 @ $T_C = 25^\circ\text{C}$	30	A
	集电极电流 @ $T_C = 100^\circ\text{C}$	15	A
$I_{LM}(1)$	箝位感性负载电流 @ $T_C = 25^\circ\text{C}$	60	A
$I_{CM}(2)$	集电极脉冲电流	60	A
$I_F$	二极管正向连续电流 @ $T_C = 25^\circ\text{C}$	30	A
	二极管正向连续电流 @ $T_C = 100^\circ\text{C}$	15	A
$I_{FM}$	二极管最大正向电流	100	A
$P_D$	最大功耗 @ $T_C = 25^\circ\text{C}$	333	W
	最大功耗 @ $T_C = 100^\circ\text{C}$	167	W
$T_J$	工作结温	-55 至 +175	$^\circ\text{C}$
$T_{stg}$	存储温度范围	-55 至 +175	$^\circ\text{C}$
$T_L$	用于焊接的最大引脚温度, 距离外壳 1/8", 持续 5 秒	300	$^\circ\text{C}$

### 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	--	0.45	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$ (二极管)	结点 - 壳体的热阻	--	2.0	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	结至环境热阻	--	40	$^\circ\text{C}/\text{W}$

注意:  
 1.  $V_{CC} = 600 \text{ V}$ ,  $V_{GE} = 15 \text{ V}$ ,  $I_C = 60 \text{ A}$ ,  $R_G = 34 \Omega$ , 感性负载  
 2. 受限于  $T_{Jmax}$

## 封装标识与订购信息

器件标识	器件	封装	卷尺寸	带宽	数量
FGH15T120SMD	FGH15T120SMD-F155	TO-247G03	-	-	30

IGBT 的电气特性  $T_C=25^\circ\text{C}$  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
<b>关断特性</b>						
$BV_{CES}$	集电极 - 发射极击穿电压	$V_{GE}=0\text{ V}, I_C=250\ \mu\text{A}$	1200	-	-	V
$I_{CES}$	集电极切断电流	$V_{CE}=V_{CES}, V_{GE}=0\text{ V}$	-	-	250	$\mu\text{A}$
$I_{GES}$	G-E 漏电流	$V_{GE}=V_{GES}, V_{CE}=0\text{ V}$	-	-	$\pm 400$	nA
<b>导通特性</b>						
$V_{GE(th)}$	G-E 阈值电压	$I_C=15\text{ mA}, V_{CE}=V_{GE}$	4.9	6.2	7.5	V
$V_{CE(sat)}$	集电极 - 发射极间饱和电压	$I_C=15\text{ A}, V_{GE}=15\text{ V}$ $T_C=25^\circ\text{C}$	-	1.8	2.4	V
		$I_C=15\text{ A}, V_{GE}=15\text{ V},$ $T_C=175^\circ\text{C}$	-	1.9	-	V
<b>动态特性</b>						
$C_{ies}$	输入电容	$V_{CE}=30\text{ V}, V_{GE}=0\text{ V},$ $f=1\text{ MHz}$	-	1460	-	pF
$C_{oes}$	输出电容		-	65	-	pF
$C_{res}$	反向传输电容		-	37	-	pF
<b>开关特性</b>						
$t_{d(on)}$	导通延迟时间	$V_{CC}=600\text{ V}, I_C=15\text{ A},$ $R_G=34\ \Omega, V_{GE}=15\text{ V},$ 感性负载, $T_C=25^\circ\text{C}$	-	32	-	ns
$t_r$	上升时间		-	47	-	ns
$t_{d(off)}$	关断延迟时间		-	490	-	ns
$t_f$	下降时间		-	12	-	ns
$E_{on}$	导通开关损耗		-	1.15	-	mJ
$E_{off}$	关断开关损耗		-	0.46	-	mJ
$E_{ts}$	总开关损耗		-	1.61	-	mJ
$t_{d(on)}$	导通延迟时间	$V_{CC}=600\text{ V}, I_C=15\text{ A},$ $R_G=34\ \Omega, V_{GE}=15\text{ V},$ 感性负载, $T_C=175^\circ\text{C}$	-	32	-	ns
$t_r$	上升时间		-	42	-	ns
$t_{d(off)}$	关断延迟时间		-	510	-	ns
$t_f$	下降时间		-	24	-	ns
$E_{on}$	导通开关损耗		-	1.86	-	mJ
$E_{off}$	关断开关损耗		-	0.70	-	mJ
$E_{ts}$	总开关损耗		-	2.56	-	mJ
$Q_g$	总栅极电荷	$V_{CE}=600\text{ V}, I_C=15\text{ A},$ $V_{GE}=15\text{ V}$	-	128	-	nC
$Q_{ge}$	栅极 - 发射极间电荷		-	11	-	nC
$Q_{gc}$	栅极 - 发射极间电荷		-	70	-	nC

## 二极管电气特性 T<sub>C</sub>=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 <sub>FM</sub>	二极管正向电压	I <sub>F</sub> = 15 A, T <sub>C</sub> = 25°C	-	2.8	3.7	V
		I <sub>F</sub> = 15 A, T <sub>C</sub> = 175°C	-	2.3	-	V
t <sub>rr</sub>	二极管反向恢复时间	V <sub>R</sub> = 600 V, I <sub>F</sub> = 15 A, di <sub>F</sub> /dt = 200 A/μs, T <sub>C</sub> = 25°C	-	72	-	ns
I <sub>rr</sub>	二极管反向恢复峰值电流		-	7.4	-	A
Q <sub>rr</sub>	二极管反向恢复电荷		-	270	-	nC
E <sub>rec</sub>	反向恢复电能	V <sub>R</sub> = 600 V, I <sub>F</sub> = 15 A, di <sub>F</sub> /dt = 200 A/μs, T <sub>C</sub> = 175°C	-	120	-	μJ
t <sub>rr</sub>	二极管反向恢复时间		-	183	-	ns
I <sub>rr</sub>	二极管反向恢复峰值电流		-	12	-	A
Q <sub>rr</sub>	二极管反向恢复电荷		-	1085	-	nC

## 典型性能特征

图 1. 典型输出特性

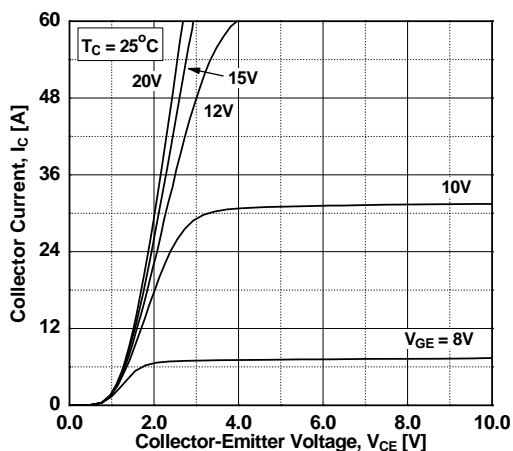


图 2. 典型输出特性

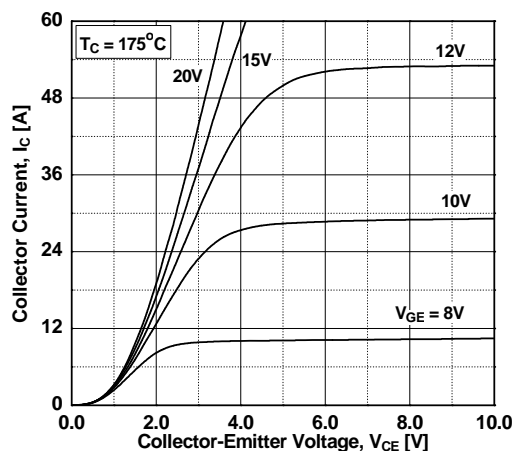


图 3. 典型饱和电压特性

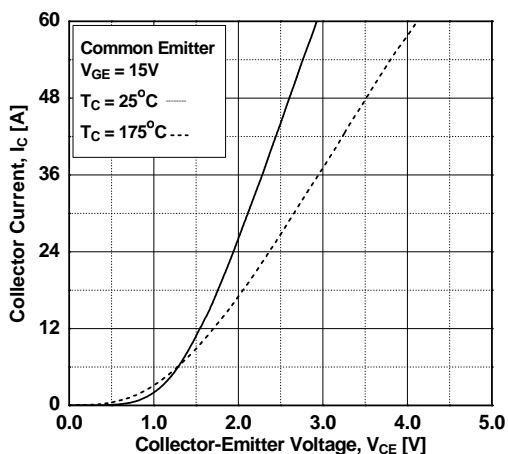


图 4. 饱和电压与壳温的关系（在可变电流强度下）

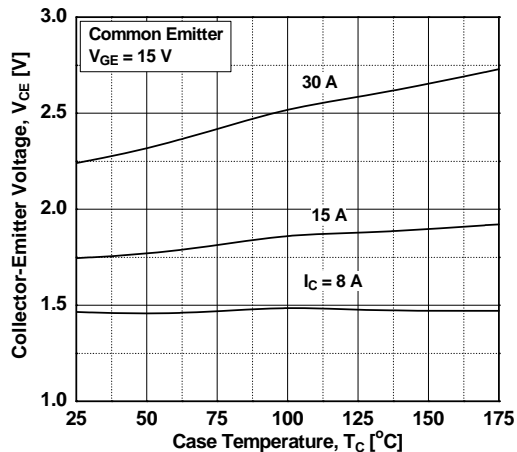


图 5. 饱和电压与 Vge 的关系

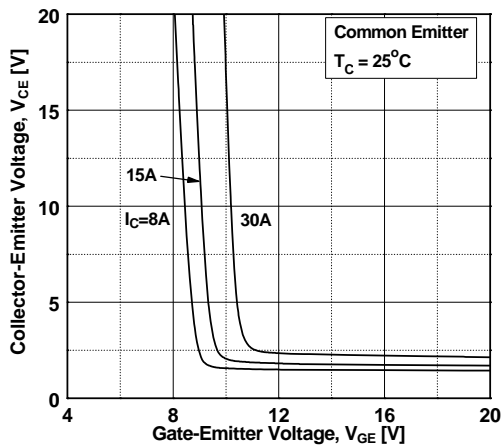
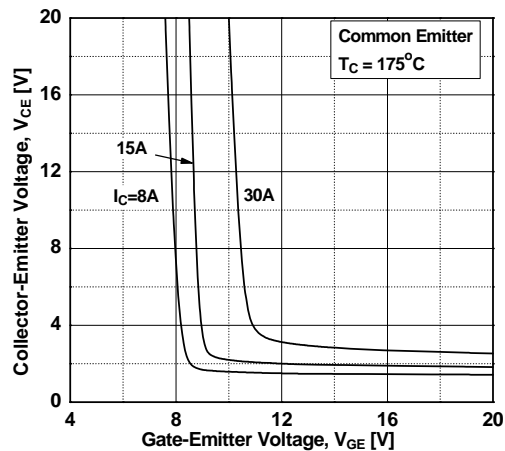


图 6. 饱和电压与 Vge 的关系



## 典型性能特征

图 7. 电容特性

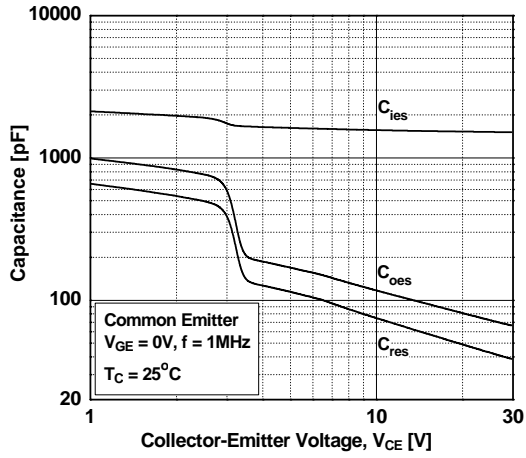


图 8. 栅极电荷特性

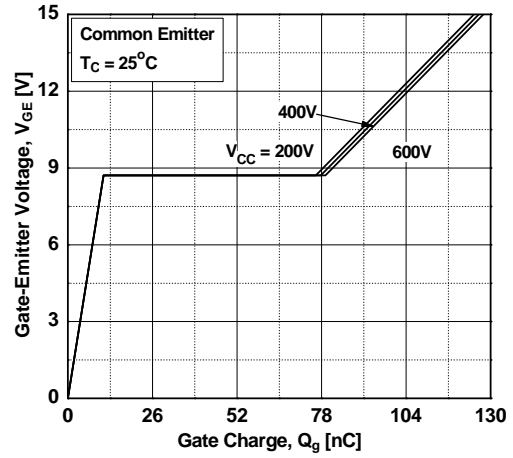


图 9. 导通特性与栅极电阻的关系

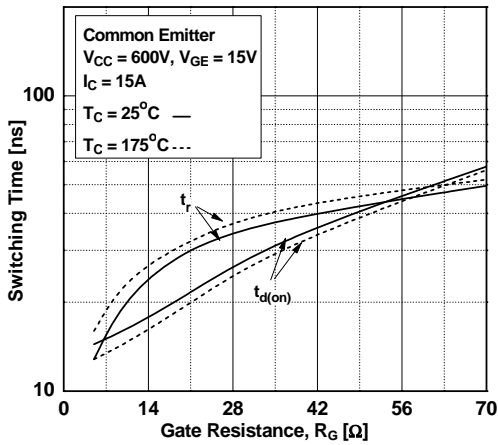


图 10. 关断特性与栅极电阻的关系

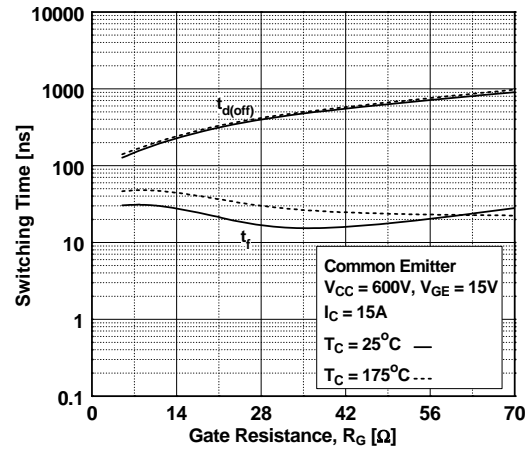


图 11. 开关损耗与栅极电阻的关系

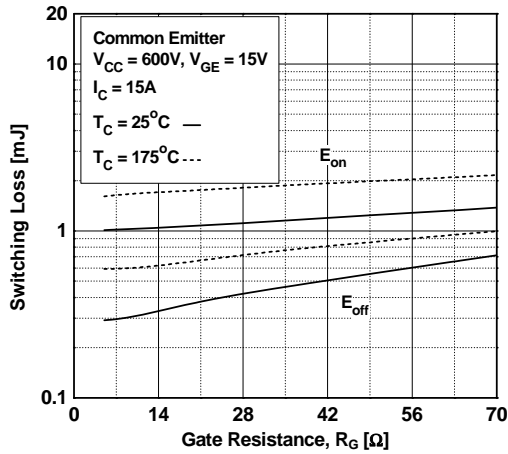
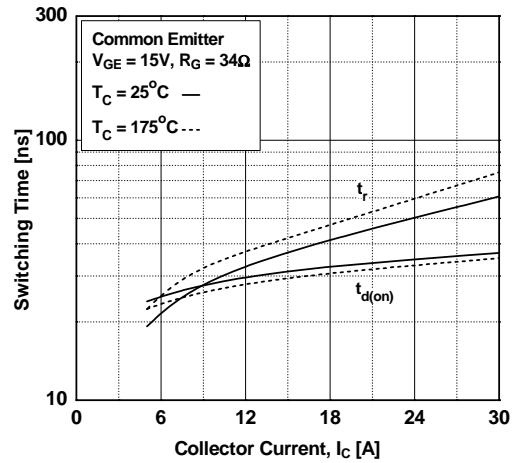


图 12. 导通特性与集电极电流的关系



### 典型性能特征

图 13. 关断特性与集电极电流的关系

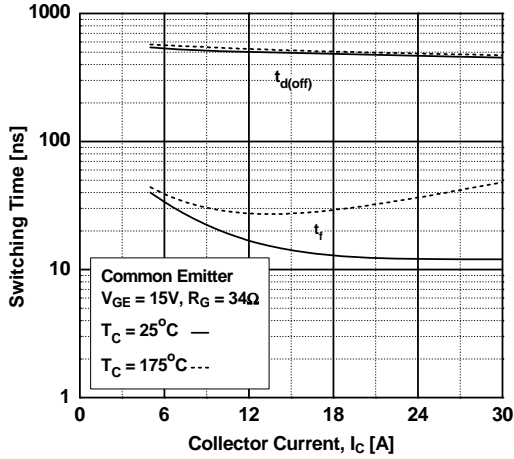


图 14. 开关损耗与集电极电流的关系

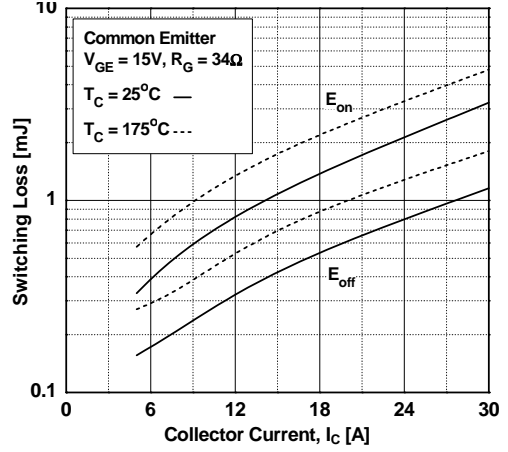


图 15. 负载电流与频率的关系

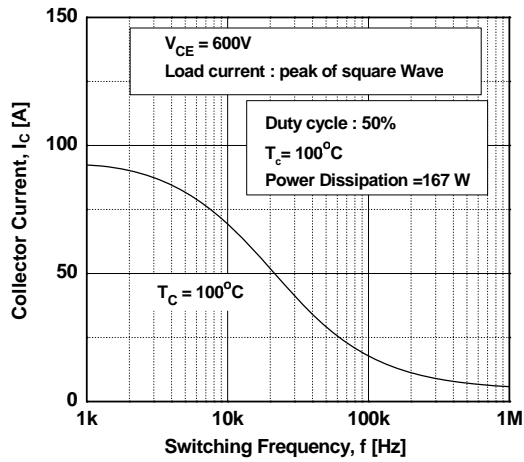


图 16. SOA 特性

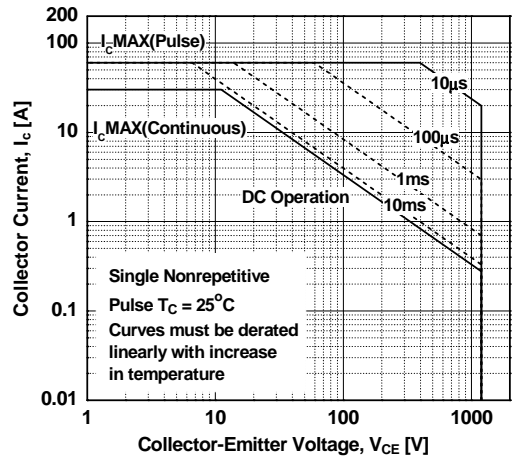


图 17. 正向特性

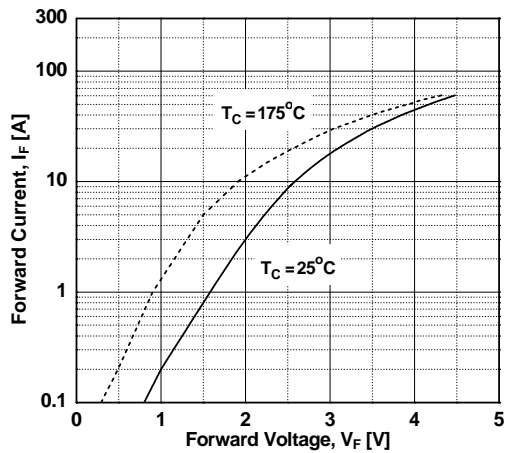
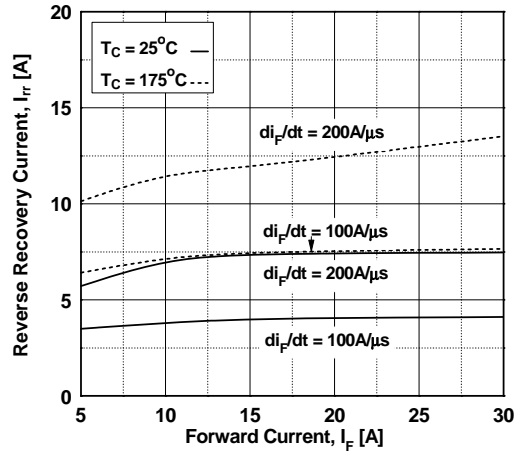


图 18. 反向恢复电流



### 典型性能特征

图 19. 反向恢复时间

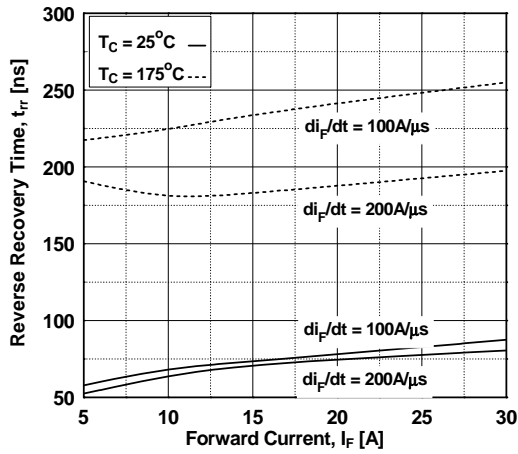


图 20. 存储电荷

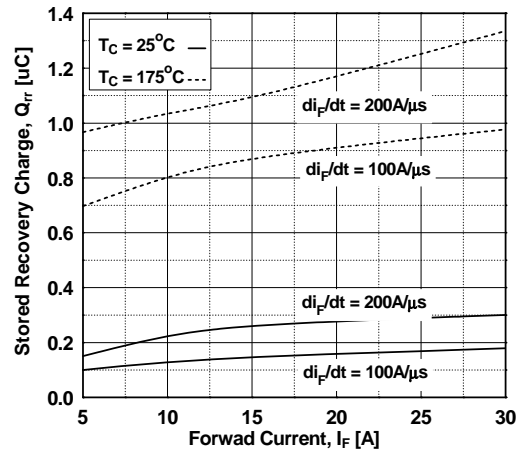


图 21. IGBT 瞬态热阻抗

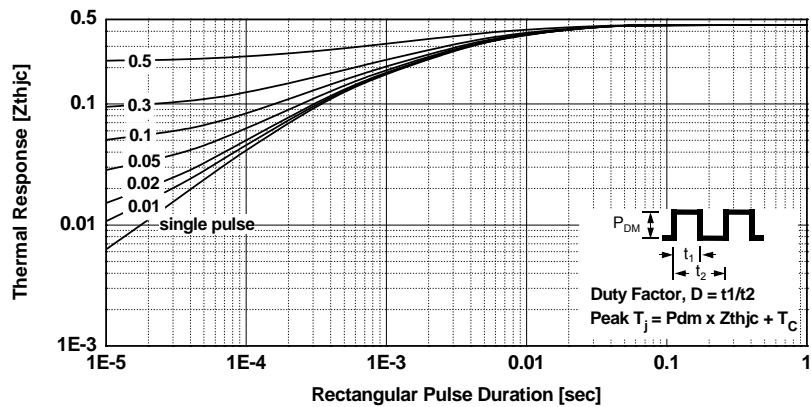
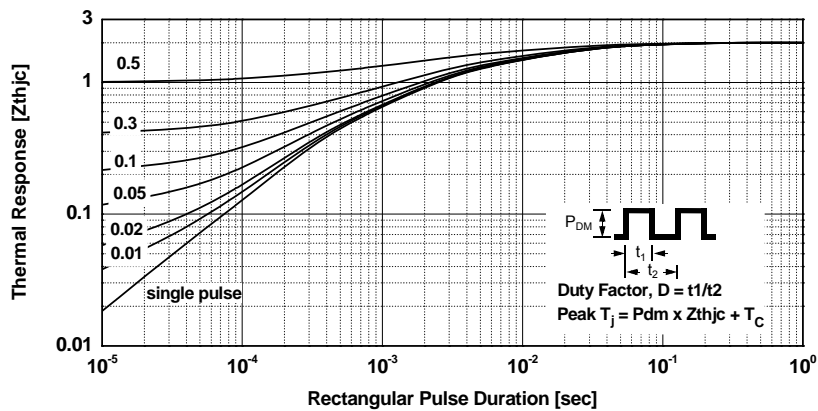
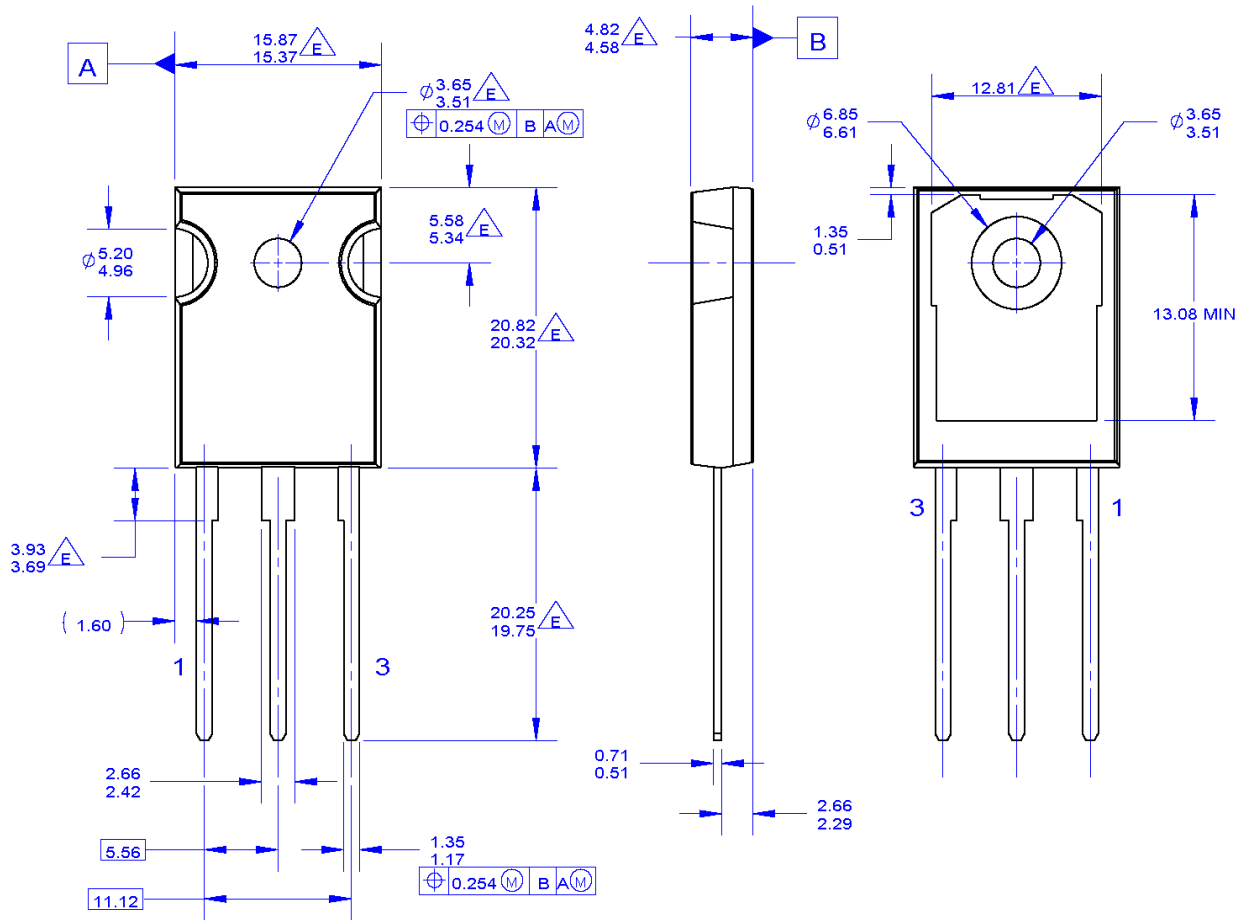


图 22. 二极管瞬态热阻抗



机械尺寸



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

- DOES NOT COMPLY JEDEC STANDARD VALUE
- F. DRAWING FILENAME: MKT-TO247G03\_REV01

图 23. TO-247, 模塑, 3 引脚, JEDEC 变体 AB (有效)

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