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FGH40T100SMD

1000 V、40 A 场截止沟道 IGBT

特性

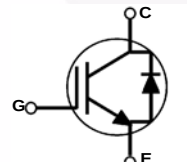
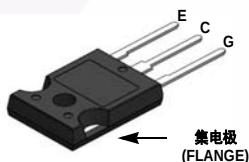
- 高电流能力
- 低饱和电压: $V_{CE(sat)} = 1.9\text{ V}$ (典型值) @ $I_C = 40\text{ A}$
- 高输入阻抗
- 快速开关
- 符合 RoHS 标准

应用

- UPS、焊接机、PFC

概述

飞兆半导体新型系列场截止沟道 IGBT 采用创新的场截止沟道 IGBT 技术, 可针对诸如 UPS、焊机和 PFC 等硬开关应用提供最佳性能。



绝对最大额定值

符号	说明	额定值	单位
V_{CES}	集电极 - 发射极之间电压	1000	V
V_{GES}	栅极 - 发射极间电压	± 25	V
	瞬态栅极 - 发射极间电压	± 30	V
I_C	集电极电流 @ $T_C = 25^\circ\text{C}$	80	A
	集电极电流 @ $T_C = 100^\circ\text{C}$	40	A
$I_{CM(1)}$	脉冲集电极电流 @ $T_C = 25^\circ\text{C}$	120	A
I_F	二极管正向电流 @ $T_C = 25^\circ\text{C}$	80	A
	二极管正向电流 @ $T_C = 100^\circ\text{C}$	40	A
$I_{FM(1)}$	脉冲二极管正向电流 @ $T_C = 25^\circ\text{C}$	120	A
P_D	最大功耗 @ $T_C = 25^\circ\text{C}$	333	W
	最大功耗 @ $T_C = 100^\circ\text{C}$	166	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	$^\circ\text{C}$

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
$R_{\theta JC}(\text{IGBT})$	结点 - 壳体的热阻	-	0.45	$^\circ\text{C/W}$
$R_{\theta JC}(\text{二极管})$	结点 - 壳体的热阻	-	0.8	$^\circ\text{C/W}$
$R_{\theta JA}$	结至环境热阻	-	40	$^\circ\text{C/W}$

封装标识与订购信息

器件标识	器件	封装	卷尺寸	带宽	数量
FGH40T100SMD	FGH40T100SMD	TO-247	-	-	30ea

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
关断特性						
BV_{CES}	集电极 - 发射极击穿电压	$V_{GE} = 0\text{ V},\ I_C = 1\text{ mA}$	1000	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	击穿温度系数电压	$V_{GE} = 0\text{ V},\ I_C = 250\ \mu\text{A}$	-	0.6	-	V/°C
I_{CES}	集电极切断电流	$V_{CE} = V_{CES},\ V_{GE} = 0\text{ V}$	-	-	1000	μA
I_{GES}	G-E 漏电流	$V_{GE} = V_{GES},\ V_{CE} = 0\text{ V}$	-	-	±500	nA
导通特性						
$V_{GE(th)}$	G-E 阈值电压	$I_C = 250\ \mu\text{A},\ V_{CE} = V_{GE}$	4.2	5.3	6.5	V
$V_{CE(sat)}$	集电极 - 发射极间饱和电压	$I_C = 40\text{ A},\ V_{GE} = 15\text{ V}$	-	1.9	2.3	V
		$I_C = 40\text{ A},\ V_{GE} = 15\text{ V},\ T_C = 175^\circ\text{C}$	-	2.4	-	V
动态特性						
C_{ies}	输入电容	$V_{CE} = 30\text{ V},\ V_{GE} = 0\text{ V},\ f = 1\text{ MHz}$	-	3980	5295	pF
C_{oes}	输出电容		-	124	165	pF
C_{res}	反向传输电容		-	76	115	pF
开关特性						
$t_{d(on)}$	导通延迟时间	$V_{CC} = 600\text{ V},\ I_C = 40\text{ A},\ R_G = 10\ \Omega,\ V_{GE} = 15\text{ V},\ \text{感性负载},\ T_C = 25^\circ\text{C}$	-	29	38	ns
t_r	上升时间		-	42	55	ns
$t_{d(off)}$	关断延迟时间		-	285	371	ns
t_f	下降时间		-	23	30	ns
E_{on}	导通开关损耗		-	2.35	3.1	mJ
E_{off}	关断开关损耗		-	1.15	1.5	mJ
E_{ts}	总开关损耗		-	3.5	4.6	mJ
$t_{d(on)}$	导通延迟时间	$V_{CC} = 600\text{ V},\ I_C = 40\text{ A},\ R_G = 10\ \Omega,\ V_{GE} = 15\text{ V},\ \text{感性负载},\ T_C = 175^\circ\text{C}$	-	27	36	ns
t_r	上升时间		-	49	64	ns
$t_{d(off)}$	关断延迟时间		-	285	371	ns
t_f	下降时间		-	20	26	ns
E_{on}	导通开关损耗		-	4.4	5.7	mJ
E_{off}	关断开关损耗		-	1.9	2.5	mJ
E_{ts}	总开关损耗		-	6.3	8.2	mJ
Q_g	总栅极电荷	$V_{CE} = 600\text{ V},\ I_C = 40\text{ A},\ V_{GE} = 15\text{ V}$	-	265	398	nC
Q_{ge}	栅极 - 发射极间电荷		-	32	48	nC
Q_{gc}	栅极 - 发射极间电荷		-	135	203	nC

二极管电气特性 $T_C = 25^\circ\text{C}$ 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
V_{FM}	二极管正向电压	$I_F = 40\text{ A}$	$T_C = 25^\circ\text{C}$	-	3.4	4.4	V
			$T_C = 175^\circ\text{C}$	-	2.6	-	
t_{rr}	二极管反向恢复时间	$I_F = 40\text{ A}, \quad di_F/dt = 200\text{ A}/\mu\text{s}$	$T_C = 25^\circ\text{C}$	-	60	78	ns
			$T_C = 175^\circ\text{C}$	-	256	-	
Q_{rr}	二极管反向恢复电荷	$I_F = 40\text{ A}, \quad di_F/dt = 200\text{ A}/\mu\text{s}$	$T_C = 25^\circ\text{C}$	-	185	260	nC
			$T_C = 175^\circ\text{C}$	-	1512	-	

典型性能特征

图 1. 典型输出特性

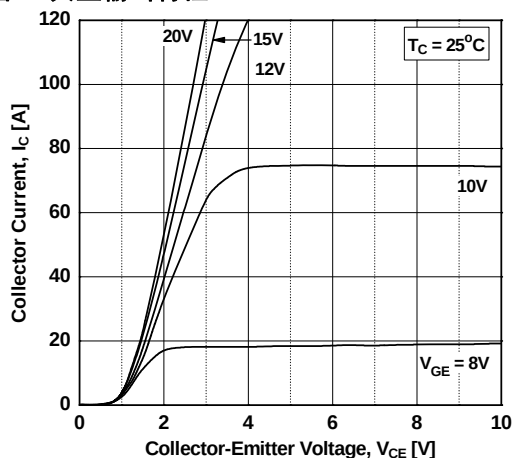


图 2. 典型输出特性

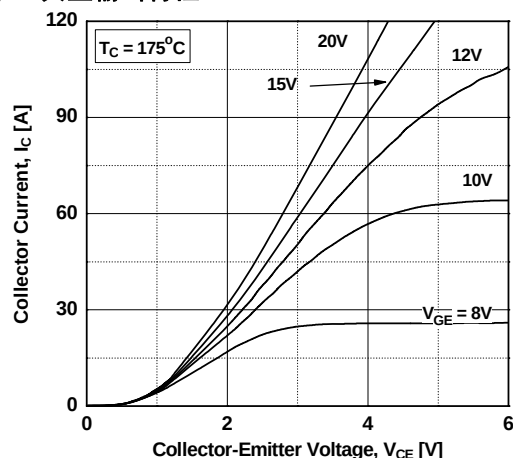


图 3. 典型饱和电压特性

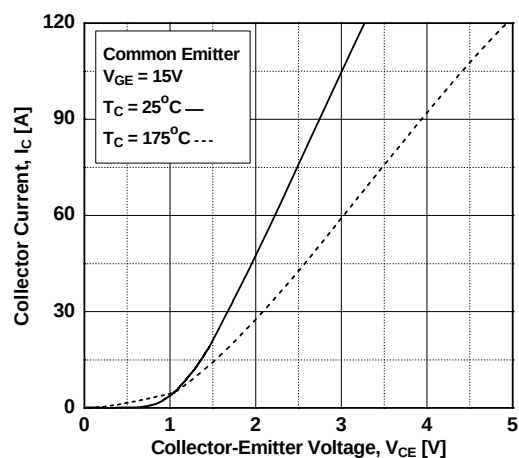
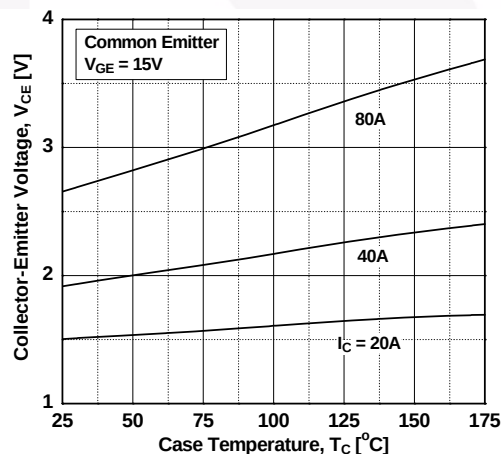
图 4. 典型饱和电压与壳温的关系
(可变电流强度下)

图 5. 饱和电压与 Vge 的关系

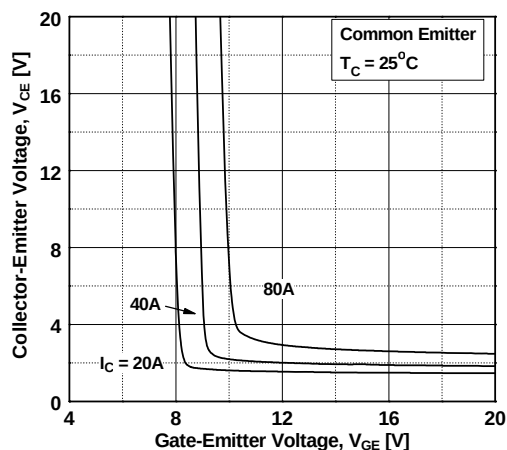
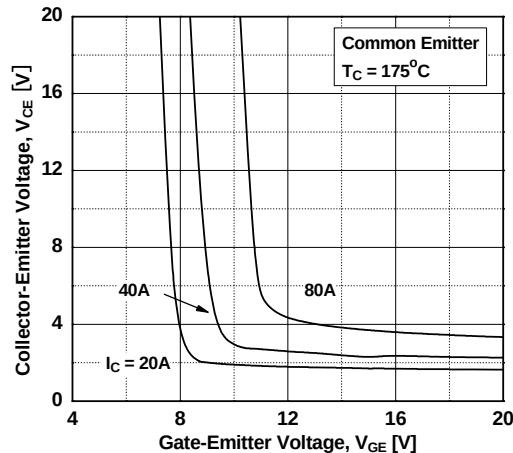


图 6. 饱和电压与 Vge 的关系



典型性能特征

图 7. 电容特性

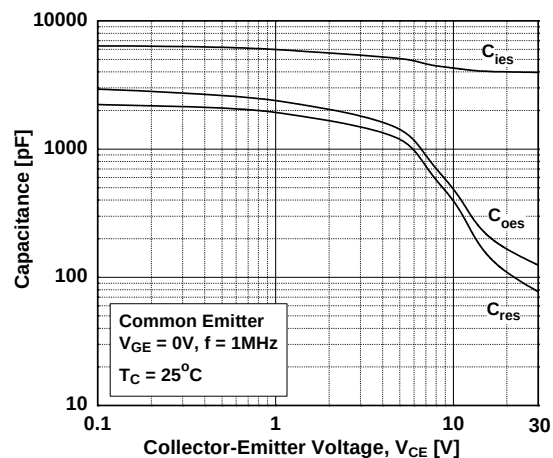


图 8. 栅极电荷特性

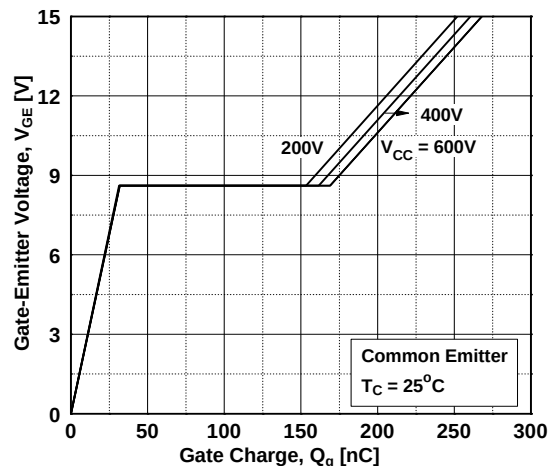


图 9. 导通特性与栅极电阻的关系

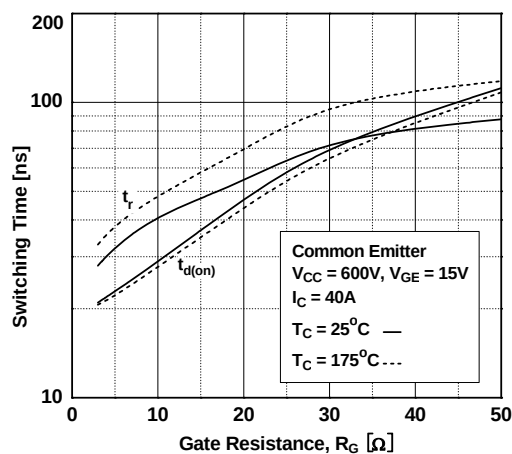


图 10. 关断特性与栅极电阻的关系

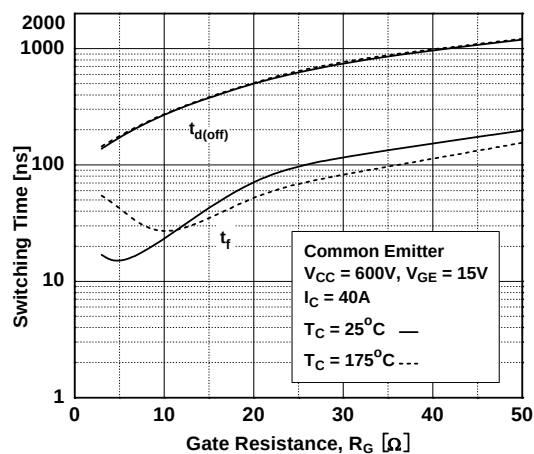


图 11. 开关损耗与栅极电阻的关系

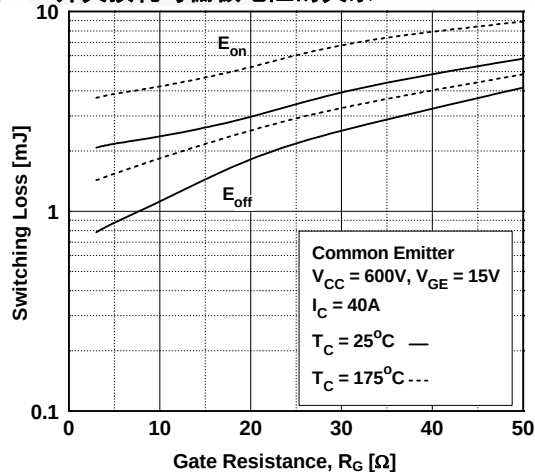
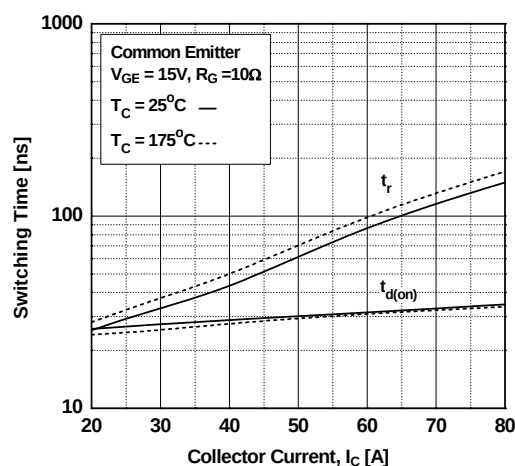


图 12. 导通特性与集电极电流的关系



典型性能特征

图 13. 关断特性与集电极电流的关系

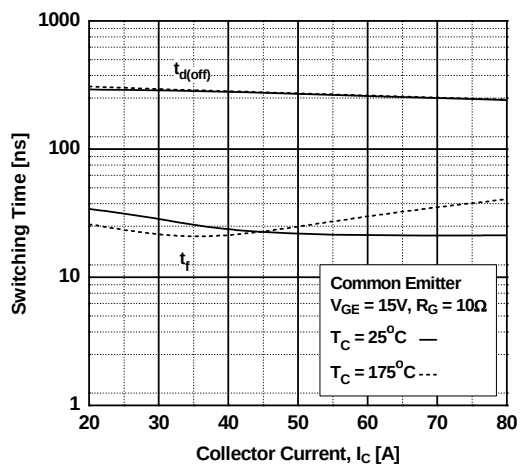


图 14. 开关损耗与集电极电流的关系

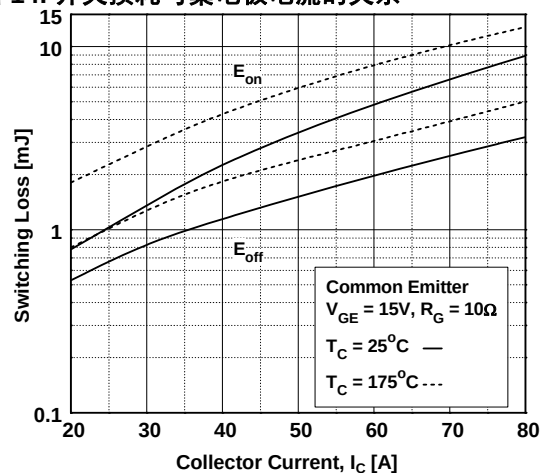


图 15. 负载电流与频率的关系

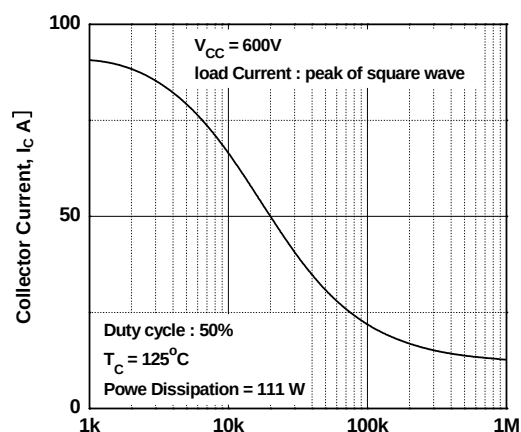


图 16. SOA 特性

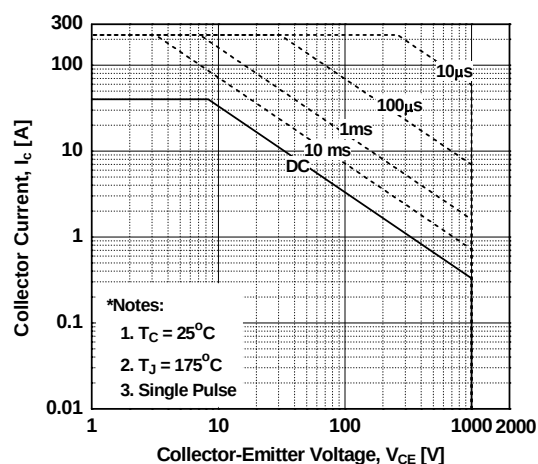


图 17. 正向特性

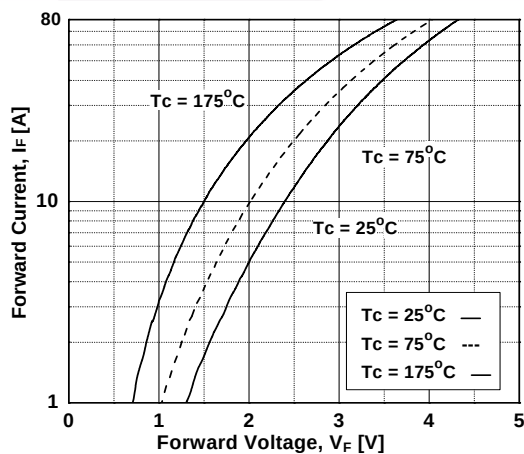
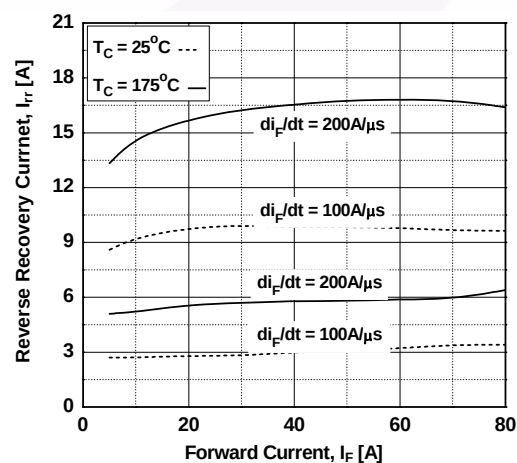


图 18. 反向恢复电流



典型性能特征

图 19. 反向恢复时间

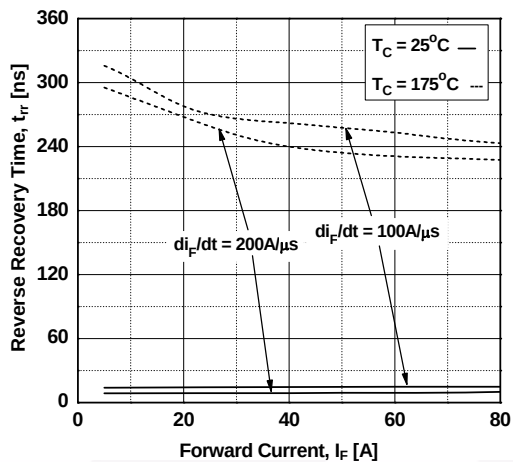


图 20. 存储电荷

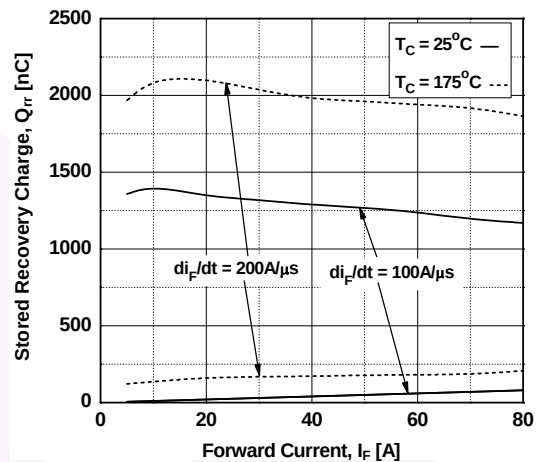


图 21. IGBT 瞬态热阻抗

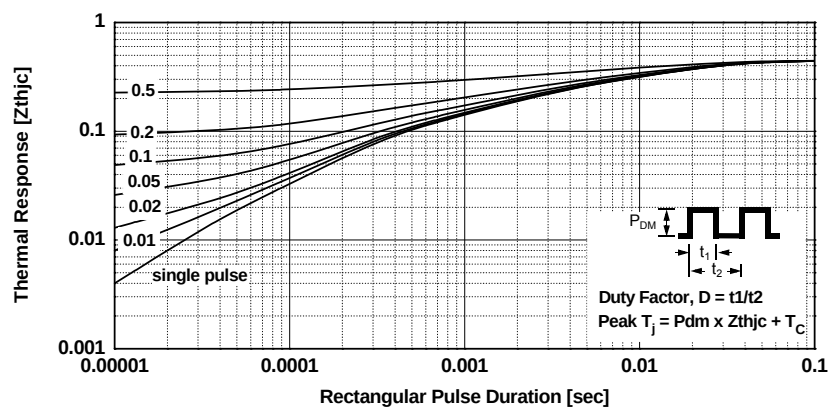
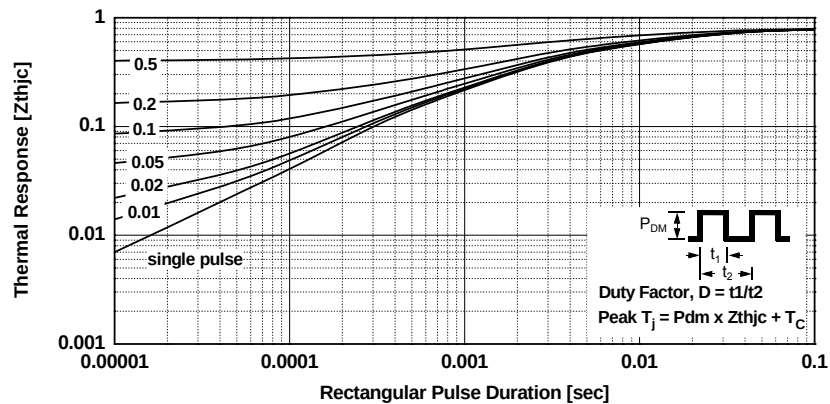


图 22. 二极管瞬态热阻抗





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