

FDD1600N10ALZD

BoostPak (N 沟道 PowerTrench® MOSFET + 二极管) 100 V, 6.8 A, 160 mΩ

特性

- $R_{DS(on)} = 124 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 3.4 \text{ A}$
- $R_{DS(on)} = 175 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 5.0 \text{ V}$, $I_D = 2.1 \text{ A}$
- 低栅极电荷 (典型值 2.78 nC)
- 低 C_{RSS} (典型值 2.04 pF)
- 快速开关
- 100% 经过雪崩测试
- 改善的 dv/dt 处理能力
- 符合 RoHS 标准

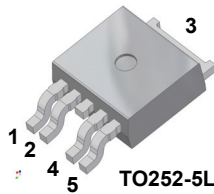
说明

此 N 沟道 MOSFET 采用飞兆半导体的 PowerTrench® 工艺生产, 这一先进工艺是专为最大限度地降低导电电阻并保持卓越开关性能而定制的。

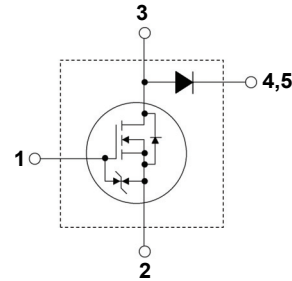
NP 二极管为超快速整流器, 具有低正向压降和出色的开关性能。

应用

- LED 显示器背光
- LED 电视背光
- LED 照明
- 消费类家用电器, DC-DC 转换器 (升压和降压)



1. 栅极
2. 源极
3. 漏极 / 阳极
4. 阴极
5. 阴极



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

符号	参数	FDD1600N10ALZD	单位
V_{DSS}	漏极-源极电压	100	V
V_{GSS}	栅极-源极电压	± 20	V
I_D	漏极电流	- 连续 ($T_C = 25^\circ\text{C}$)	A
		- 连续 ($T_C = 100^\circ\text{C}$)	
I_{DM}	漏极电流	- 脉冲 (说明 1)	A
E_{AS}	单脉冲雪崩能量	(说明 2)	mJ
dv/dt	二极管恢复 dv/dt 峰值	(说明 3)	V/ns
P_D	功耗	($T_C = 25^\circ\text{C}$)	W
		- 降低至 25°C 以上	W/ $^\circ\text{C}$
I_F	二极管连续正向电流 ($T_C = 124^\circ\text{C}$)	4	A
I_{FM}	二极管最大正向电流	40	A
T_J, T_{STG}	工作和存储温度范围	-55 至 +150	$^\circ\text{C}$
T_L	用于焊接的最大引线温度, 距离外壳 1/8", 持续 5 秒	300	$^\circ\text{C}$

热性能

符号	参数	FDD1600N10ALZD	单位
$R_{\theta JC}$	MOSFET 结至外壳热阻最大值	8.4	$^\circ\text{C/W}$
$R_{\theta JC}$	二极管结至外壳热阻最大值	3.3	
$R_{\theta JA}$	结至环境热阻最大值	87	

封装标识与订购信息

器件编号	顶标	封装	包装方法	卷尺寸	带宽	数量
FDD1600N10ALZD	1600N10ALZD	TO-252 5L	卷带	13"	16 mm	2500 装

MOSFET 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
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关断特性

BV_{DSS}	漏极-源极击穿电压	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0\ \text{V}$	100	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	击穿电压温度系数	$I_D = 250\ \mu\text{A}$, 温度参考 25°C	-	0.1	-	$\text{V}/^\circ\text{C}$
I_{DSS}	零栅极电压漏极电流	$V_{DS} = 80\ \text{V}$, $V_{GS} = 0\ \text{V}$ $V_{DS} = 80\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_C = 125^\circ\text{C}$	-	-	1 500	μA
I_{GSS}	栅极-源极漏电流	$V_{GS} = \pm 20\ \text{V}$, $V_{DS} = 0\ \text{V}$	-	-	± 10	μA

导通特性

$V_{GS(th)}$	栅极阈值电压	$V_{GS} = V_{DS}$, $I_D = 250\ \mu\text{A}$	1.4	2.1	2.8	V
$R_{DS(on)}$	漏极至源极静态导通电阻	$V_{GS} = 10\ \text{V}$, $I_D = 3.4\ \text{A}$ $V_{GS} = 5\ \text{V}$, $I_D = 2.1\ \text{A}$	-	124 175	160 375	$\text{m}\Omega$
g_{FS}	正向跨导	$V_{DS} = 10\ \text{V}$, $I_D = 6.8\ \text{A}$	-	19.6	-	S

动态特性

C_{iss}	输入电容	$V_{DS} = 50\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	-	169	225	pF
C_{oss}	输出电容		-	43	55	pF
C_{rss}	反向传输电容		-	2.04	-	pF
$C_{oss(er)}$	能量相关输出电容	$V_{DS} = 50\ \text{V}$, $V_{GS} = 0\ \text{V}$	-	85	-	pF
$Q_g(\text{tot})$	10 V 的栅极电荷总量	$V_{GS} = 10\ \text{V}$	-	2.78	3.61	nC
$Q_g(\text{tot})$	5 V 的栅极电荷总量	$V_{GS} = 5\ \text{V}$	-	1.5	1.95	nC
Q_{gs}	栅极-源极栅极电荷	$V_{DD} = 50\ \text{V}$, $I_D = 6.8\ \text{A}$ (说明 4)	-	0.72	-	nC
Q_{gd}	栅极-漏极“米勒”电荷		-	0.56	-	nC
$V_{plateau}$	栅极平台电压		-	4.02	-	V
Q_{sync}	总栅极电荷同步	$V_{DS} = 0\ \text{V}$, $I_D = 3.4\ \text{A}$	-	2.5	-	nC
Q_{oss}	输出电荷	$V_{DS} = 50\ \text{V}$, $V_{GS} = 0\ \text{V}$	-	5.2	-	nC

开关特性

$t_{d(on)}$	导通延迟时间	$V_{DD} = 50\ \text{V}$, $I_D = 6.8\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_G = 4.7\ \Omega$ (说明 4)	-	7	24	ns
t_r	开通上升时间		-	2	14	ns
$t_{d(off)}$	关断延迟时间		-	13	36	ns
t_f	关断下降时间		-	2	14	ns
ESR	等效串联电阻 (G-S)	$f = 1\ \text{MHz}$	-	2.1	-	Ω

漏极-源极二极管特性

I _S	漏极 - 源极二极管最大正向连续电流		-	-	6.8	A
I _{SM}	漏极 - 源极二极管最大正向脉冲电流		-	-	13.6	A
V _{SD}	漏极 - 源极二极管正向电压	V _{GS} = 0 V, I _{SD} = 6.8 A	-	-	1.3	V
t _{rr}	反向恢复时间	V _{GS} = 0 V, I _{SD} = 6.8 A, V _{DS} = 50 V,	-	37	-	ns
Q _{rr}	反向恢复电荷	dI _F /dt = 100 A/μs	-	42	-	nC

注意:

- 重复额定值: 脉冲宽度受限于最大结温。
- $L = 1\ \text{mH}$, $I_{AS} = 3.18\ \text{A}$, $R_G = 25\ \Omega$, 启动 $T_J = 25^\circ\text{C}$ 。
- $I_{SD} \leq 6.8\ \text{A}$, $di/dt \leq 200\ \text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, 启动 $T_J = 25^\circ\text{C}$ 。
- 本质上独立于工作温度的典型特性。

二极管的电气特性 $T_C = 25^\circ\text{C}$ 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
V_R	直流阻断电压	$I_R = 1\text{ mA}$	150	-	-	V
V_{FM}	最大瞬时正向电压	$I_F = 4\text{ A}$	$T_C = 25^\circ\text{C}$ -	-	2.5	V
			$T_C = 125^\circ\text{C}$ -	1.01	-	
I_{RM}	最大瞬时反向电流 @ 额定值 V_R		$T_C = 25^\circ\text{C}$ -	-	50	uA
			$T_C = 125^\circ\text{C}$ -	-	1000	
t_{rr}	二极管反向恢复时间	$I_F = 4\text{ A},$ $di/dt = 200\text{ A}/\mu\text{s}$	$T_C = 25^\circ\text{C}$ -	12.7	26	ns
			$T_C = 125^\circ\text{C}$ -	17.1	-	
I_{rr}	二极管反向恢复峰值电流		$T_C = 25^\circ\text{C}$ -	2.6	6	A
			$T_C = 125^\circ\text{C}$ -	3.8	-	
Q_{rr}	二极管反向恢复电荷		$T_C = 25^\circ\text{C}$ -	18.3	-	nC
			$T_C = 125^\circ\text{C}$ -	35.7	-	
W_{AVL}	雪崩能量 ($L = 40\text{ mH}$)		10	-	-	mJ

典型性能特征 - MOSFET

图 1. 导通区域特性

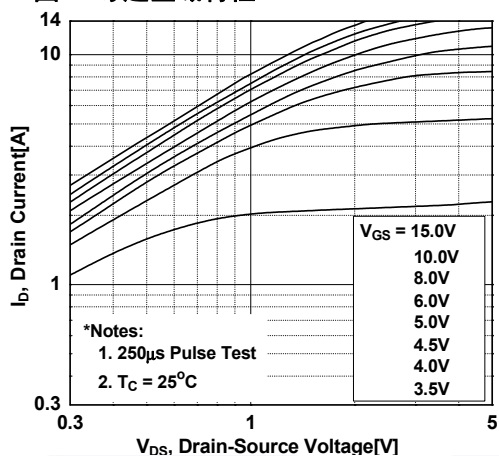


图 2. 传输特性

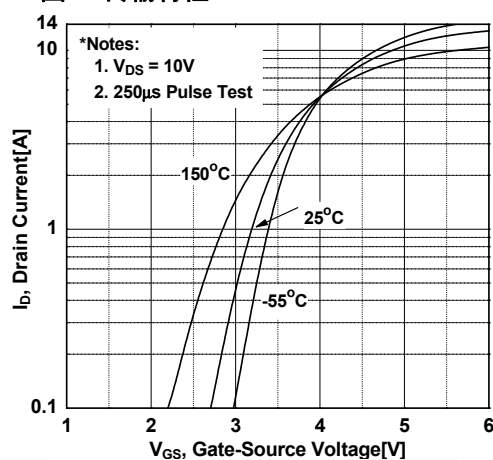


图 3. 导通电阻变化 vs. 漏极电流和栅极电压

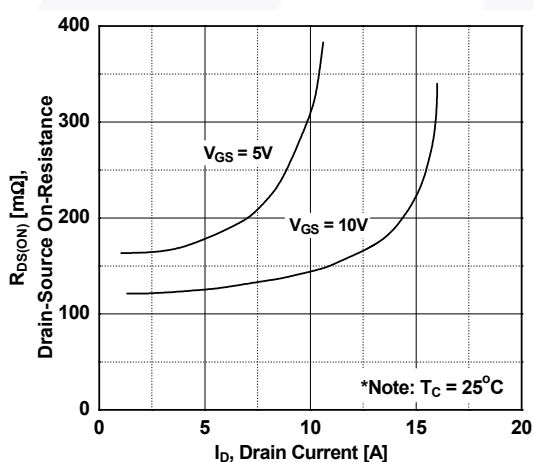


图 4. 体二极管正向电压变化 vs. 源极电流和温度

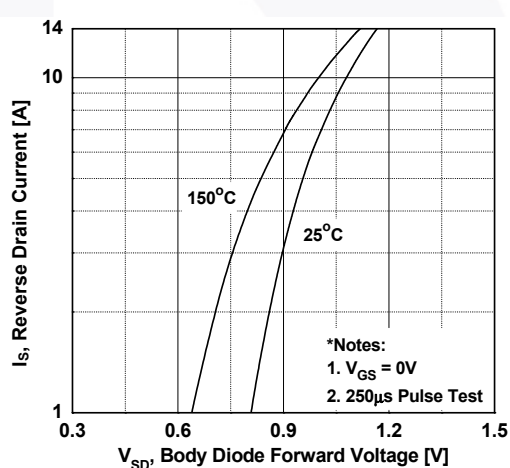


图 5. 电容特性

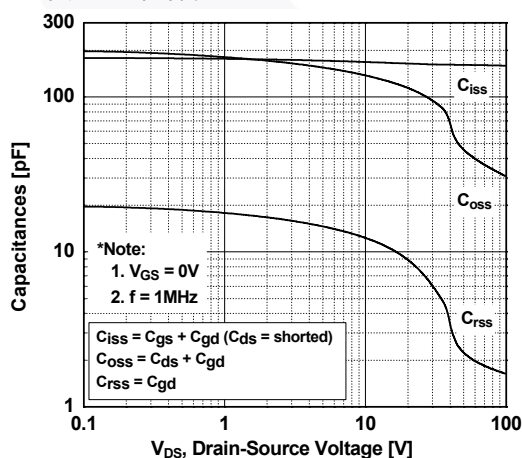
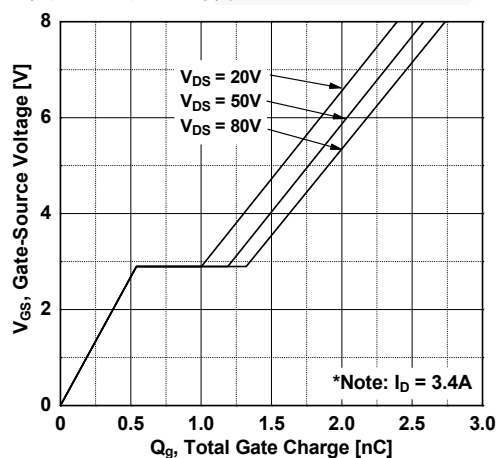


图 6. 栅极电荷特性



典型性能特征 - MOSFET (续)

图 7. 击穿电压变化 vs. 温度

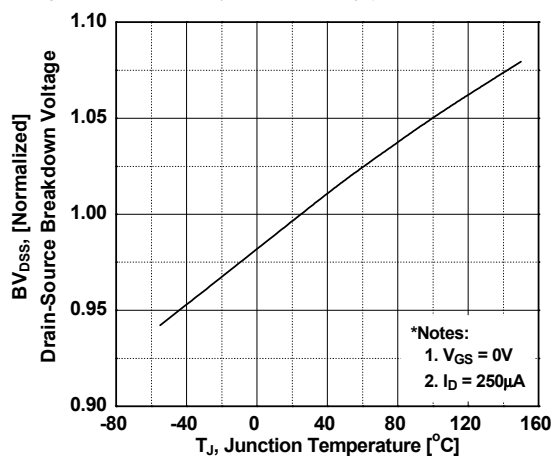


图 8. 导通电阻变化 vs. 温度

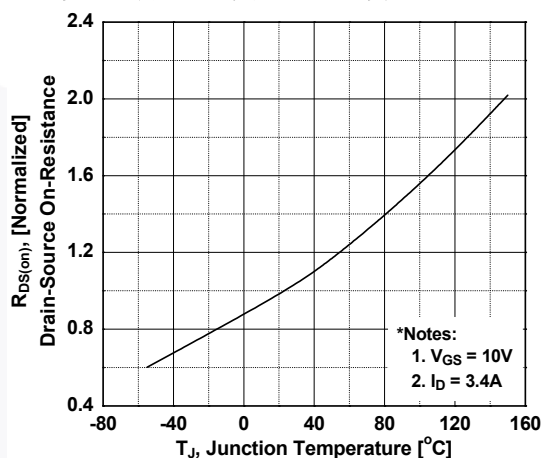


图 9. 最大安全工作区

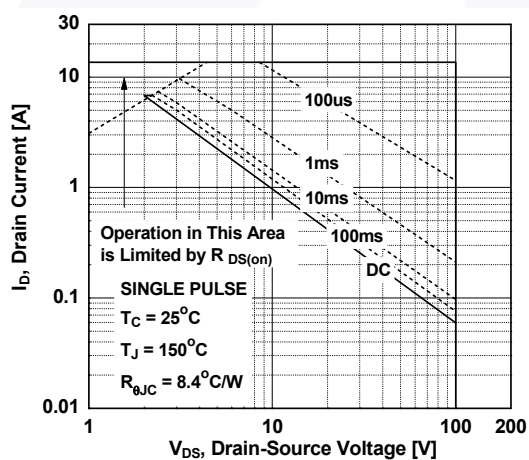


图 10. 最大漏极电流 vs. 外壳温度

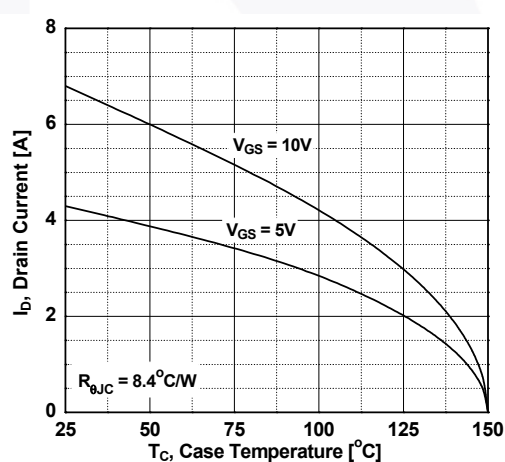


图 11. Eoss 与漏极至源极电压

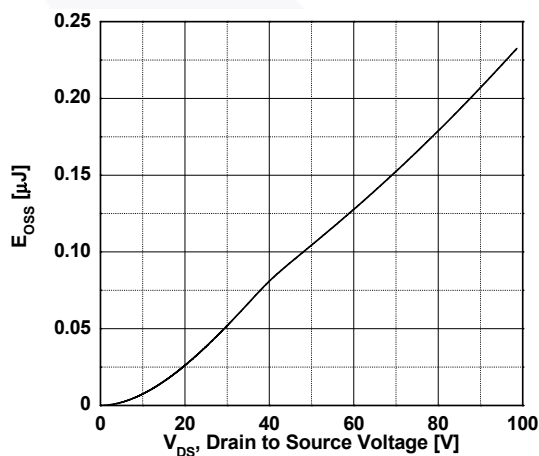
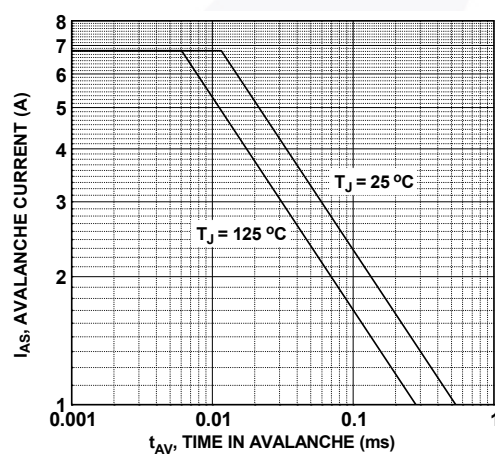


图 12. 非箝位感性开关能力



典型性能特征 - 二极管 (续)

图 13. 正向压降与正向电流

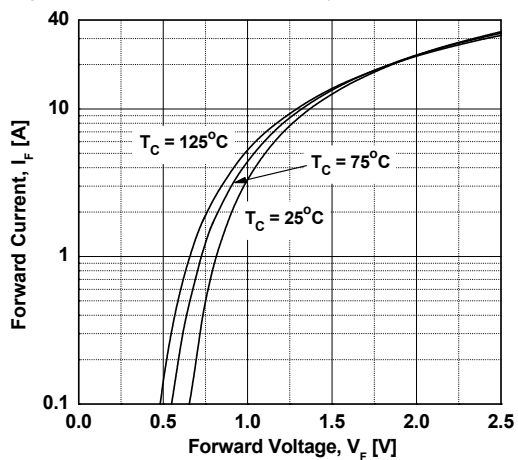


图 14. 反向电流与反向电压

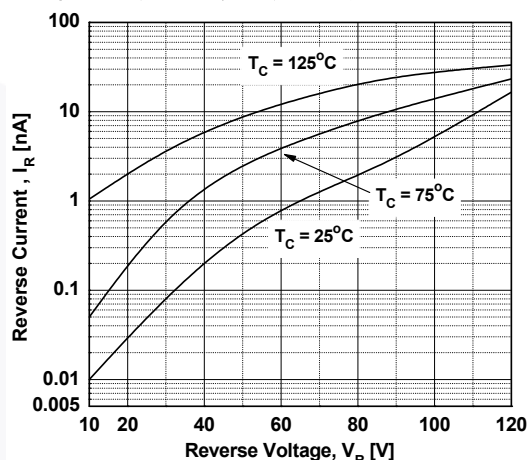


图 15. 结电容

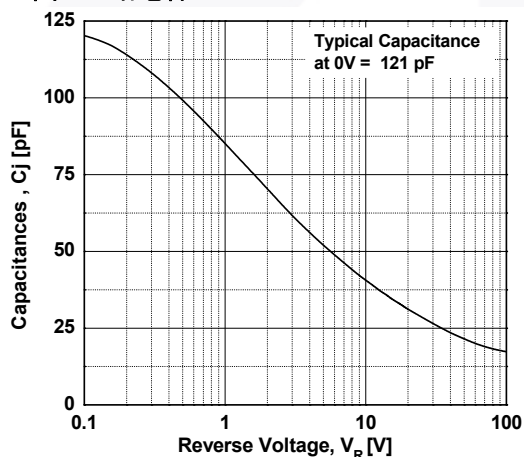


图 16. 反向恢复时间与 di/dt

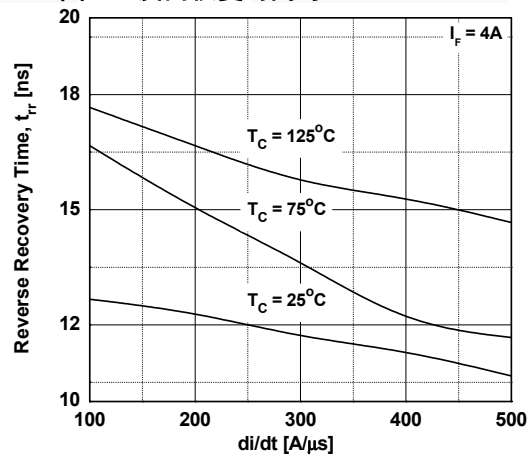


图 17. 反向恢复电流与 di/dt

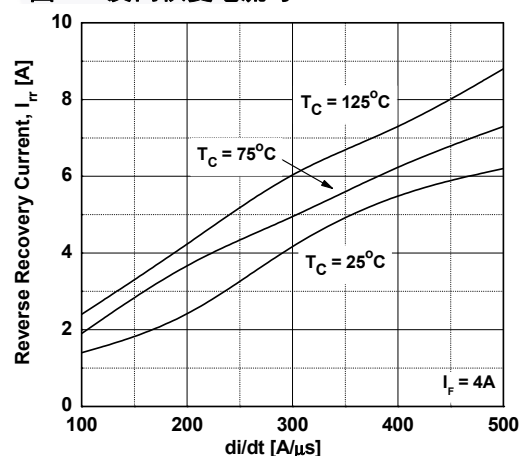
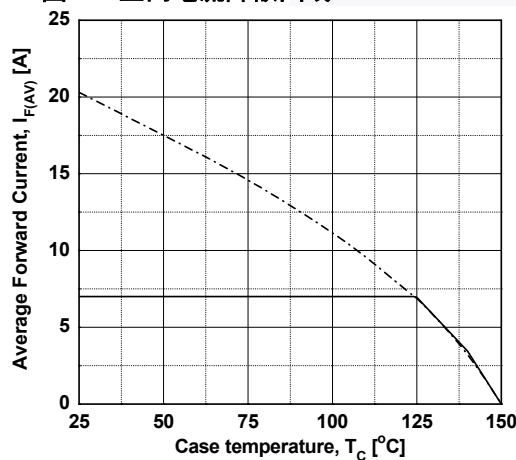


图 18. 正向电流降额曲线



典型性能特征 (接上页)

图 19. 瞬态热响应曲线 MOSFET

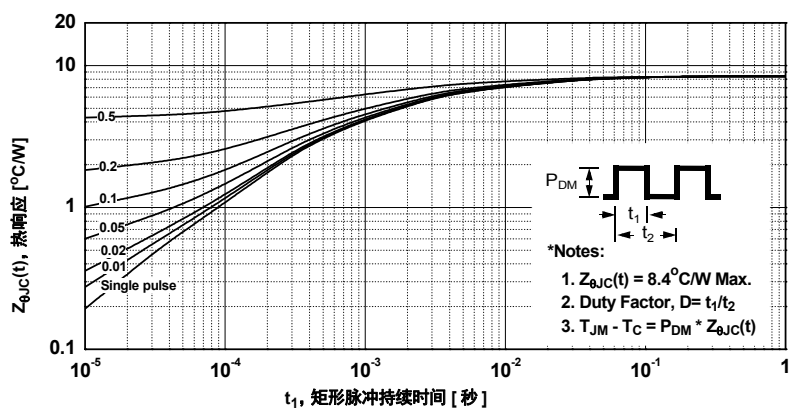
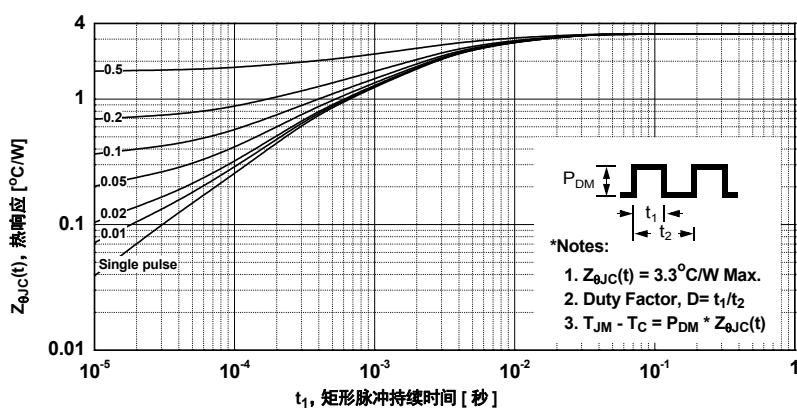


图 20. 瞬态热响应曲线 二极管



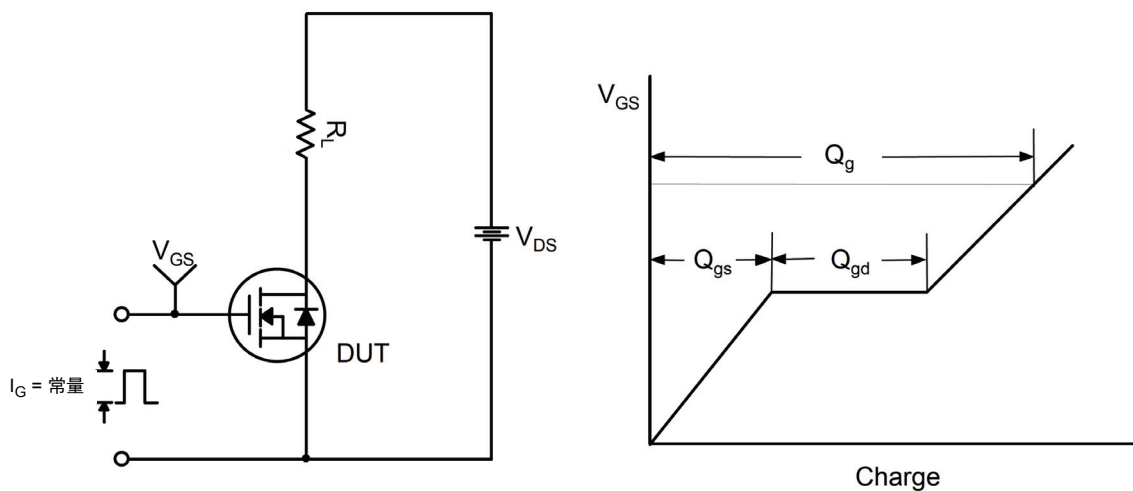


图 21. 栅极电荷测试电路与波形

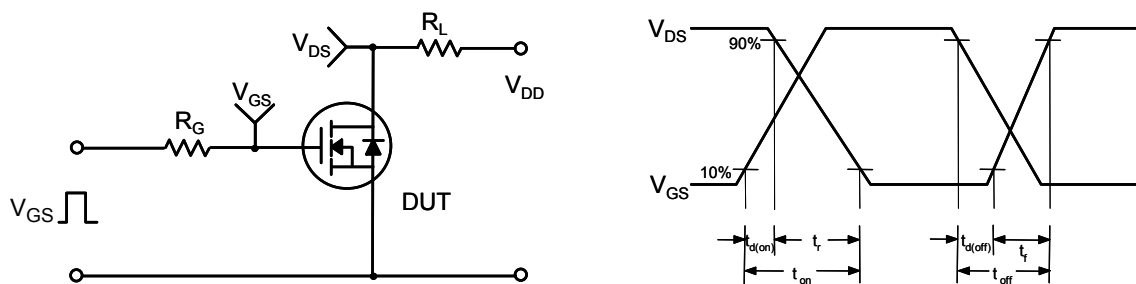


图 22. 阻性开关测试电路与波形

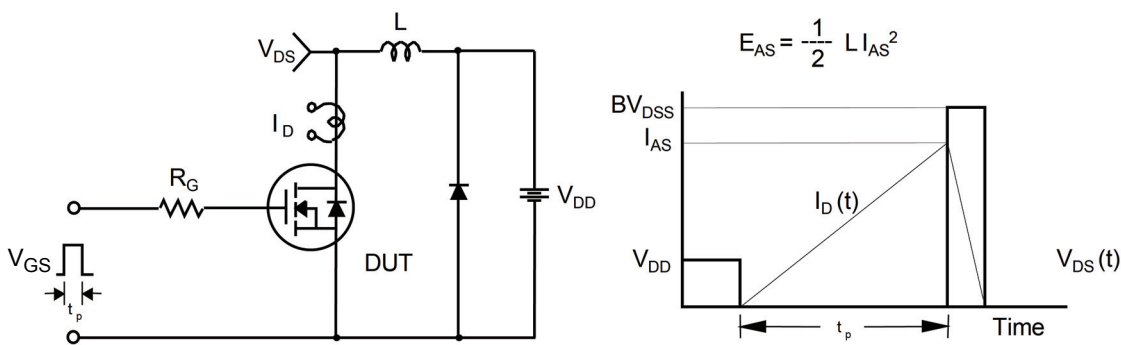


图 23. 非箝位感性开关测试电路与波形

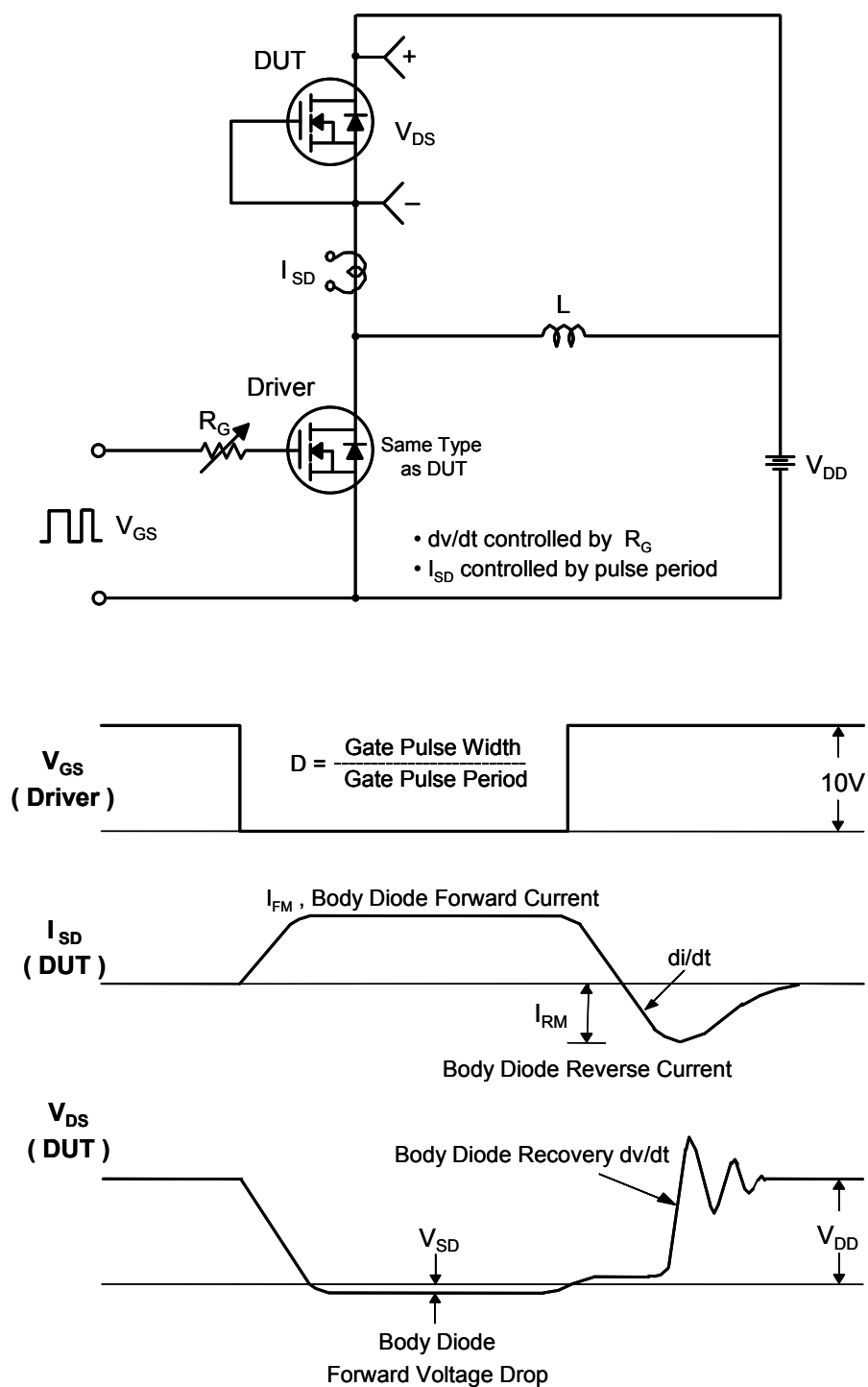


图 24. 二极管恢复 dv/dt 峰值测试电路与波形

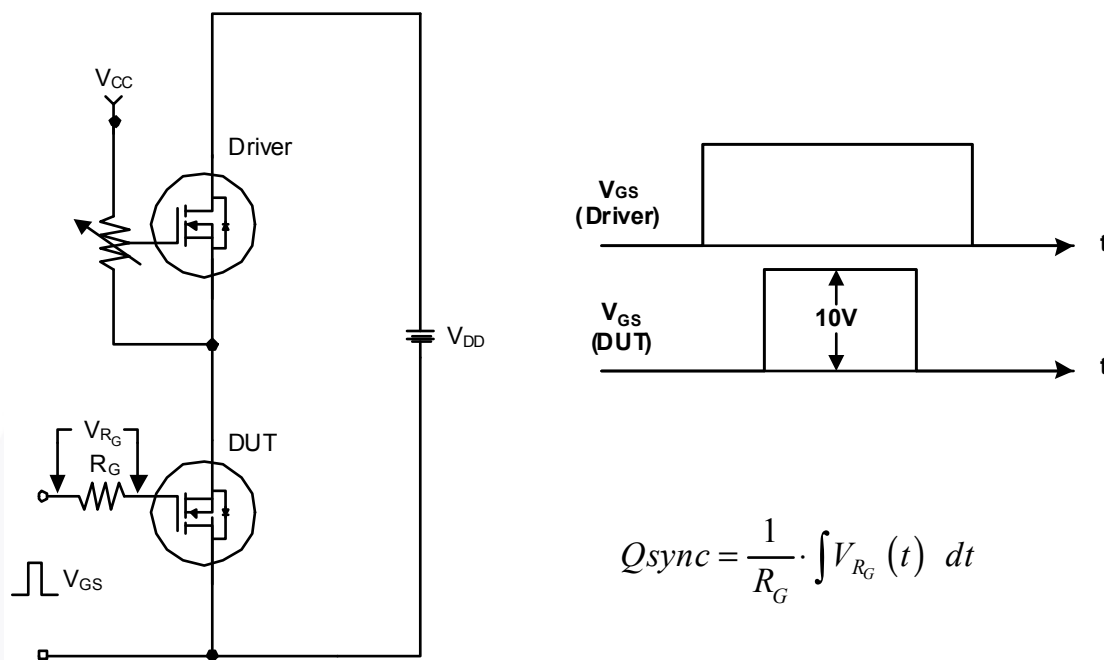


图 25. 总栅极电荷 Q_{sync} . 测试电路与波形

机械尺寸

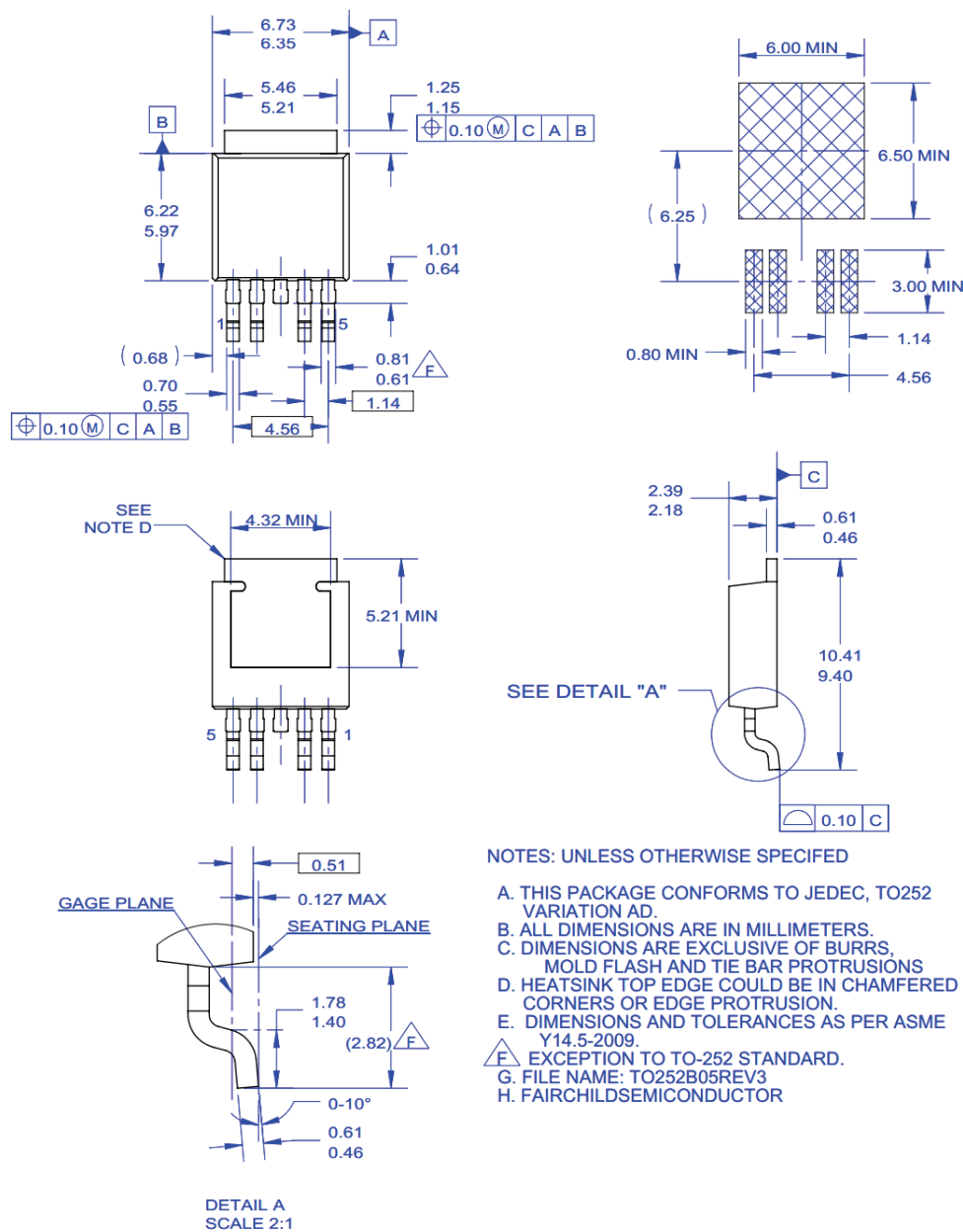


图 26. TO252 (D-PAK), 模塑, 5 引脚, 选项 AD

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