FAIRCHILD™

Is Now Part of

ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at www.onsemi.com

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

2014 年 10 月

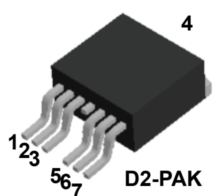
FDB024N04AL7
N-Channel PowerTrench® MOSFET
40 V, 219 A, 2.4 mΩ

特性
- $R_{DS(on)}$ = 2.0 mΩ （典型值） @ V_{GS} = 10V, I_D = 80 A
- 快速开关速度
- 低栅极电荷
- 高性能沟道技术可实现极低的 $R_{DS(on)}$
- 高功率和高电流处理能力
- 符合 RoHS 标准

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

应用
- 用于 ATX/ 服务器 / 电信 PSU 的同步整流
- 电池保护电路
- 电机驱动和不间断电源

100% LEAD-FREE IMPLEMENTATION

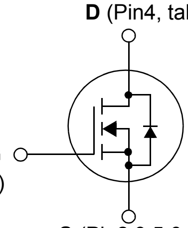


D2-PAK
(TO-263)

1. 栅极
2. 源极
3. 源极
4. 漏极
5. 源极
6. 源极
7. 源极

D (Pin4, tab)

G (Pin1)



S (Pin2,3,5,6,7)

MOSFET 最大额定值 T_C = 25°C 除非另有说明。

符号	参数		额定值	单位
V_{DSS}	漏极－源极电压		40	V
V_{GSS}	栅极－源极电压		±20	V
I_D	漏极电流	- 连续 （T_C = 25°C，硅限制）	219*	A
		- 连续 （T_C=100°C，硅限制）	155*	
		- 连续 (T_C = 25°C, 封装限制）	100	
I_{DM}	漏极电流	- 脉冲 （注 1）	876	A
E_{AS}	单脉冲雪崩能量 （注 2）		864	mJ
dv/dt	二极管恢复 dv/dt 峰值 （注 3）		6.0	V/ns
P_D	功耗	(T_C = 25°C)	214	W
		- 高于 25°C 的功耗系数	1.43	W/°C
T_J, T_{STG}	工作和存储温度范围		-55 至 +175	°C
T_L	用于焊接的最高引脚温度，距离外壳 1/8”，持续 5 秒		300	°C

* 连续电流是基于最高可允许的结温计算所得。封装限制电流为 120 A。

热性能

符号	参数	额定值	单位
$R_{\theta JC}$	结点 - 壳体的热阻	0.7	°C/W
$R_{\theta JA}$	结至环境热阻	62.5	

封装标识与定购信息

器件标识	器件	封装	卷尺寸	带宽	数量
FDB024N04A	FDB024N04AL7	D2-PAK-7L	330mm	24mm	800

电气特性 T_C = 25°C 除非另有说明

关断特性

符号	参数	测试条件	最小值	典型值	最大值	单位
BV_{DSS}	漏极－源极击穿电压	I_D = 250 μA, V_{GS} = 0 V, T_C = 25°C	40	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	击穿电压温度系数	I_D = 250 μA, 参考 25°C 数值	-	30	-	mV/°C
I_{DSS}	零栅极电压漏极电流	V_{DS} = 32 V, V_{GS} = 0 V	-	-	10	μA
		V_{DS} = 32 V, T_C = 150°C	-	-	500	μA
I_{GSS}	栅极－体漏电流	V_{GS} = ±20 V, V_{DS} = 0 V	-	-	±100	nA

导通特性

符号	参数	测试条件	最小值	典型值	最大值	单位
$V_{GS(th)}$	栅极阈值电压	V_{GS} = V_{DS}, I_D = 250 μA	1.0	-	3.0	V
$R_{DS(on)}$	漏极至源极静态导通电阻	V_{GS} = 10 V, I_D = 80 A	-	2.0	2.4	mΩ
g_{FS}	正向跨导	V_{DS} = 10 V, I_D = 80 A （注 4）	-	368	-	S

动态特性

符号	参数	测试条件	最小值	典型值	最大值	单位
C_{iss}	输入电容	V_{DS} = 25 V, V_{GS} = 0 V f = 1 MHz	-	5490	7300	pF
C_{oss}	输出电容		-	1220	1620	pF
C_{rss}	反向传输电容		-	155	233	pF
$Q_{g(tot)}$	10 V 的栅极电荷总量	V_{DS} = 32 V, I_D = 80 A V_{GS} = 10 V （注 4, 5）	-	84	109	nC
Q_{gs}	栅极－源极栅极电荷		-	19	-	nC
Q_{gs2}	阈值电压－“米勒”平台电荷		-	9.5	-	nC
Q_{gd}	栅极－漏极“米勒”电荷		-	12	-	nC

开关特性

符号	参数	测试条件	最小值	典型值	最大值	单位
$t_{d(on)}$	导通延迟时间	V_{DD} = 20 V, I_D = 80 A R_{GEN} = 4.7 Ω, V_{GS} = 10 V （注 4, 5）	-	17	44	ns
t_r	导通上升时间		-	8	26	ns
$t_{d(off)}$	关断延迟时间		-	71	152	ns
t_f	关断下降时间		-	17	44	ns
ESR	等效串联电阻 (G-S)		-	1.1	-	Ω

漏极 - 源极二极管特性

符号	参数	测试条件	最小值	典型值	最大值	单位
I_S	漏极－源极二极管最大正向连续电流		-	-	219	A
I_{SM}	漏极－源极二极管最大正向脉冲电流		-	-	876	A
V_{SD}	漏极－源极二极管正向电压	V_{GS} = 0 V, I_{SD} = 80 A	-	-	1.3	V
t_{rr}	反向恢复时间	V_{GS} = 0 V, I_{SD} = 80 A dI_F/dt = 100 A/μs （注 4）	-	54	-	ns
Q_{rr}	反向恢复电荷		-	49	-	nC

注：

1. 重复额定值：脉冲宽度受限于最大结温
2. L = 3 mH, I_{AS} = 24 A, V_{DD} = 40 V, R_G = 25 Ω, 开始于 T_J = 25°C
3. I_{SD} ≤ 80 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, 开始于 T_J = 25°C
4. 脉冲测试：测试脉宽 ≤ 300 μs, 占空比 ≤ 2%
5. 典型特性本质上独立于工作温度

典型性能特征

图 **1.** 导通区域特性

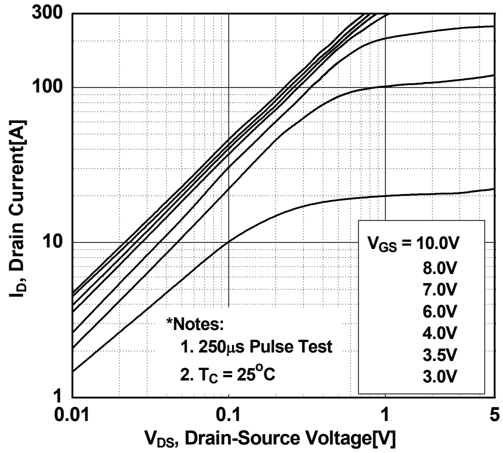


图 **2.** 传输特性

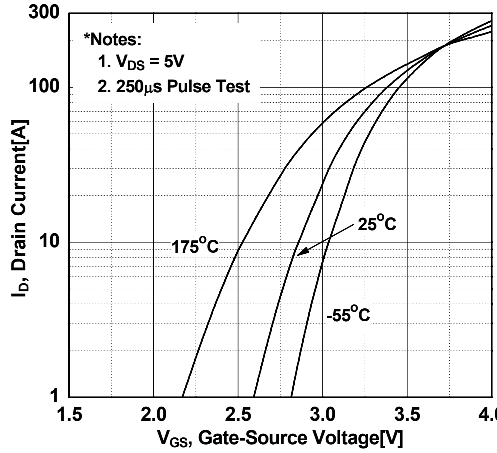


图 **3.** 导通电阻变化与漏极电流和栅极电压的关系

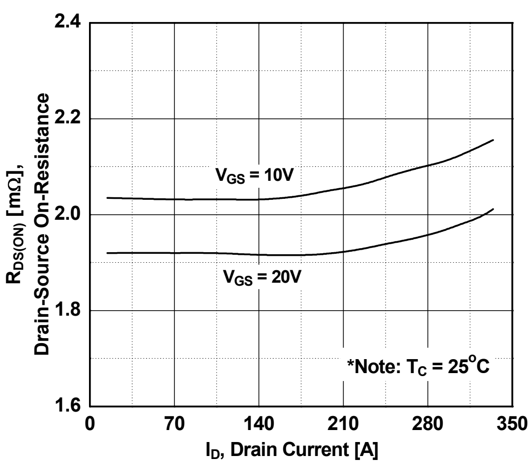


图 **4.** 体二极管正向电压变化与源极电流和温度的关系

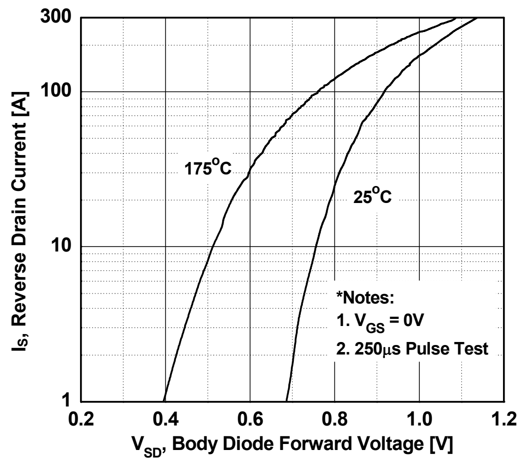


图 **5.** 电容特性

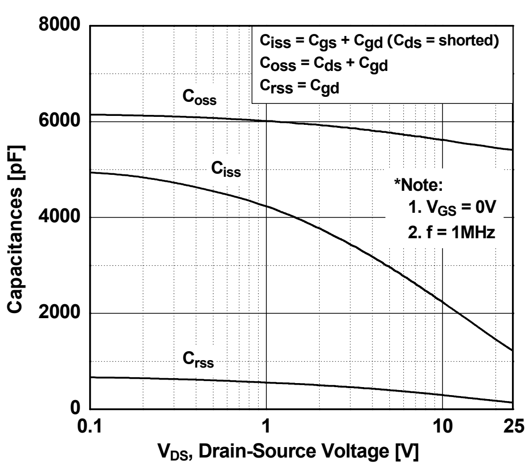
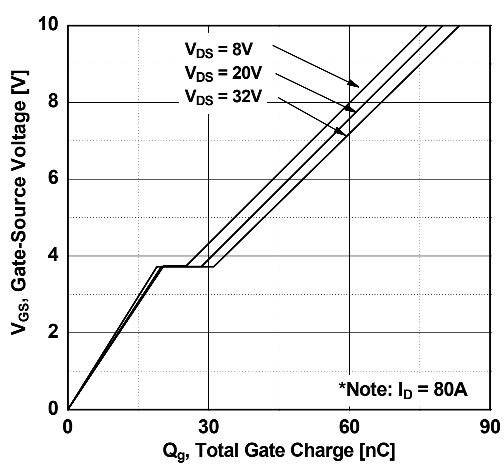


图 **6.** 栅极电荷特性



典型性能特性（接上页）

图 **7.** 击穿电压变化与温度的关系

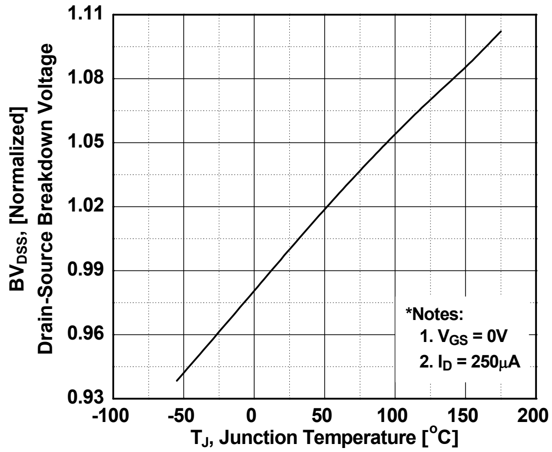


图 **8.** 导通电阻变化与温度的关系

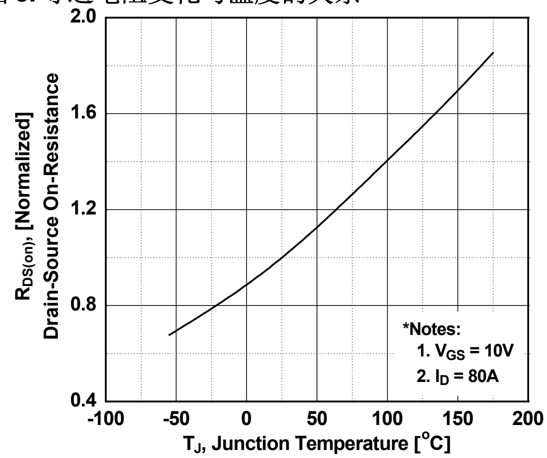


图 **9.** 最大安全工作区

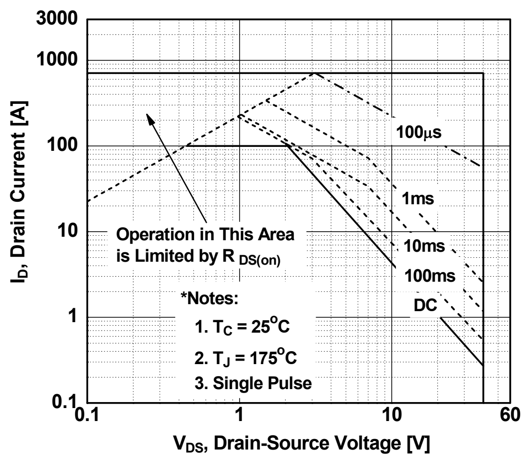


图 **10.** 最大漏极电流与壳温的关系

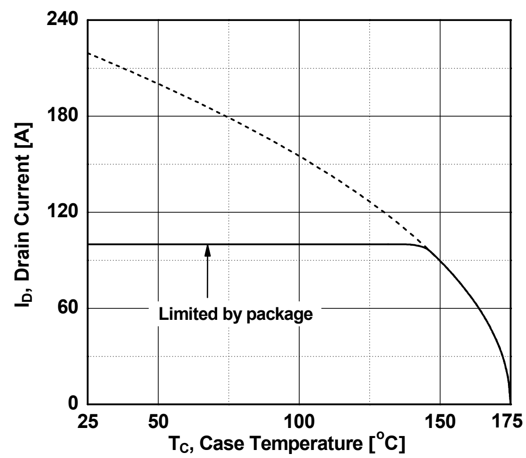
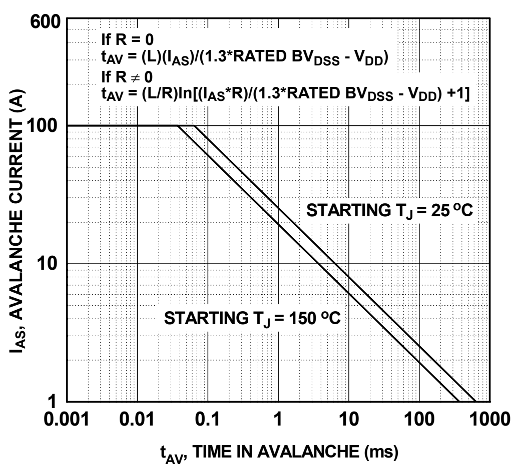


图 **11.** 非箝位电感开关能力



典型性能特性（接上页）

图 12. 瞬态热响应曲线

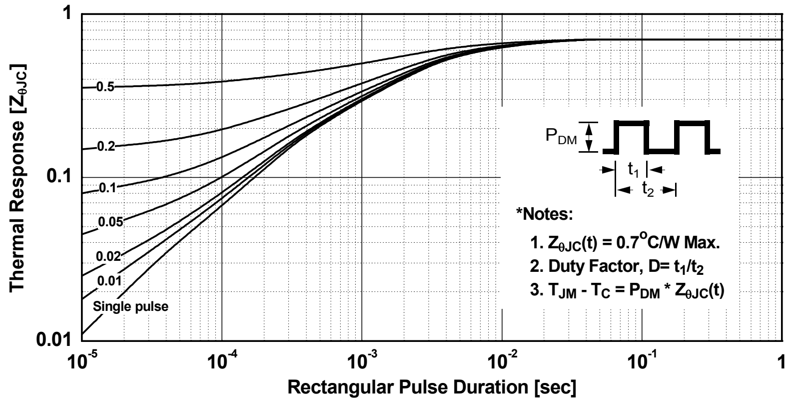


图 **13.** 栅极电荷测试电路与波形

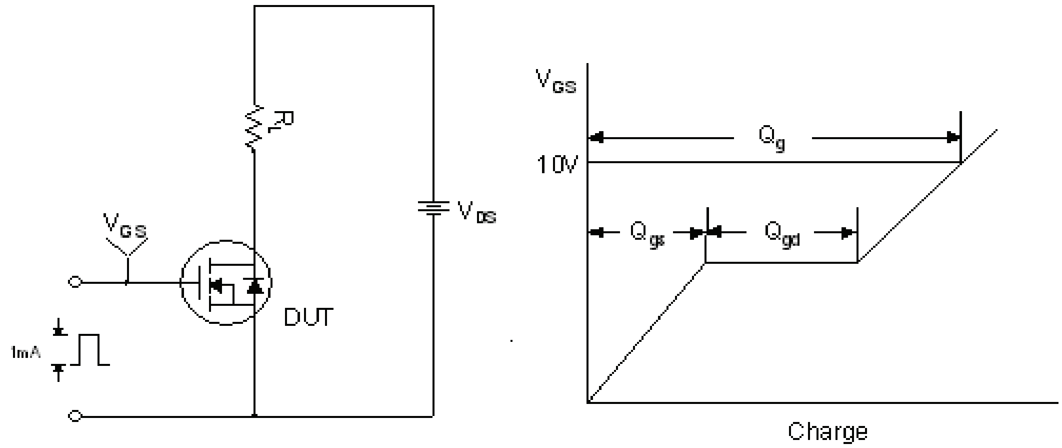


图 **14.** 阻性开关测试电路与波形

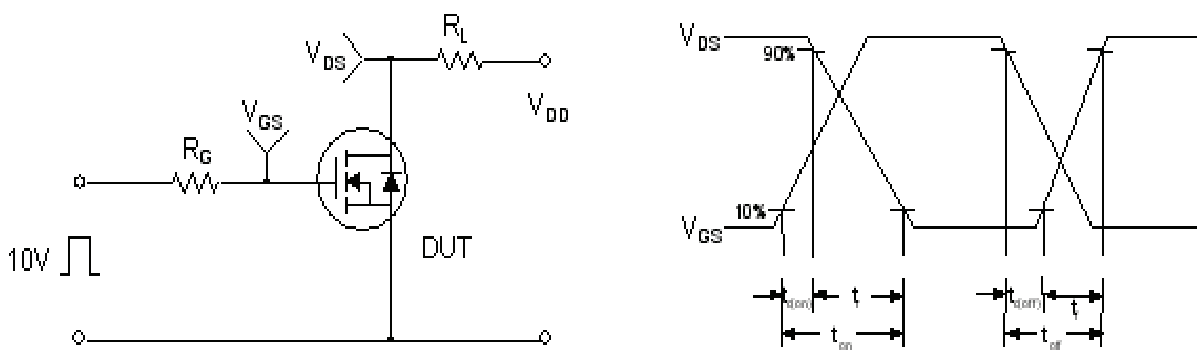


图 **15.** 非箝位感性开关测试电路与波形

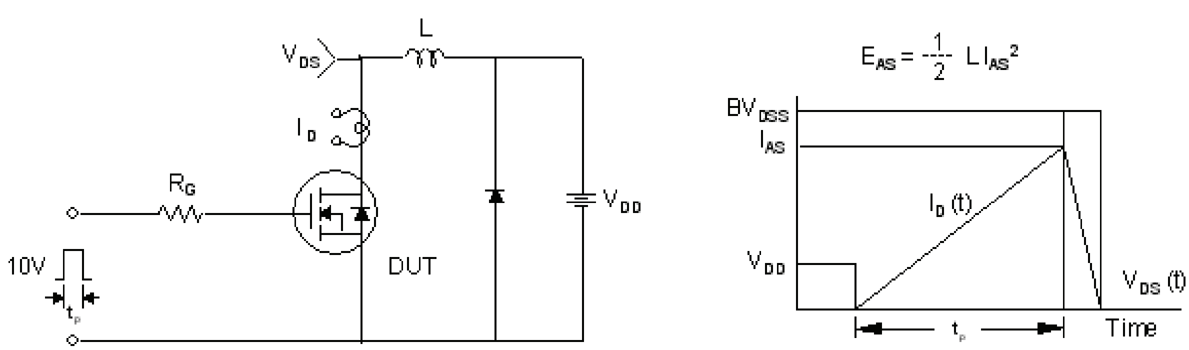
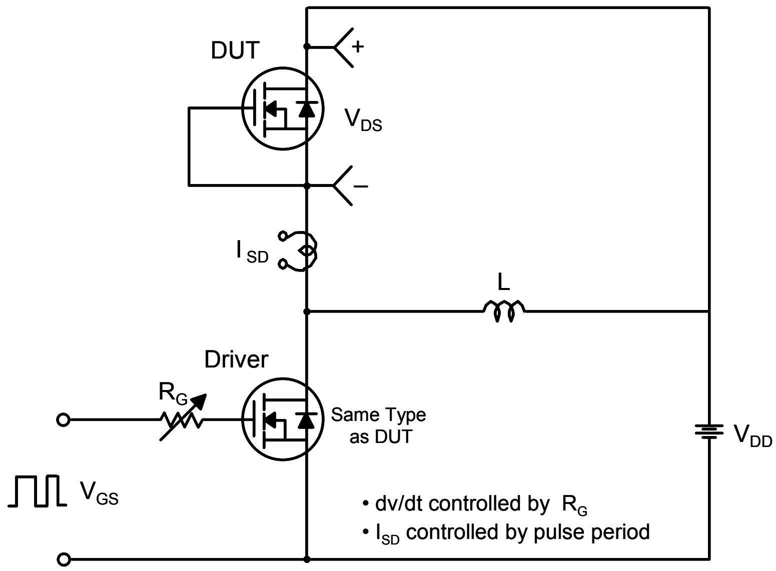
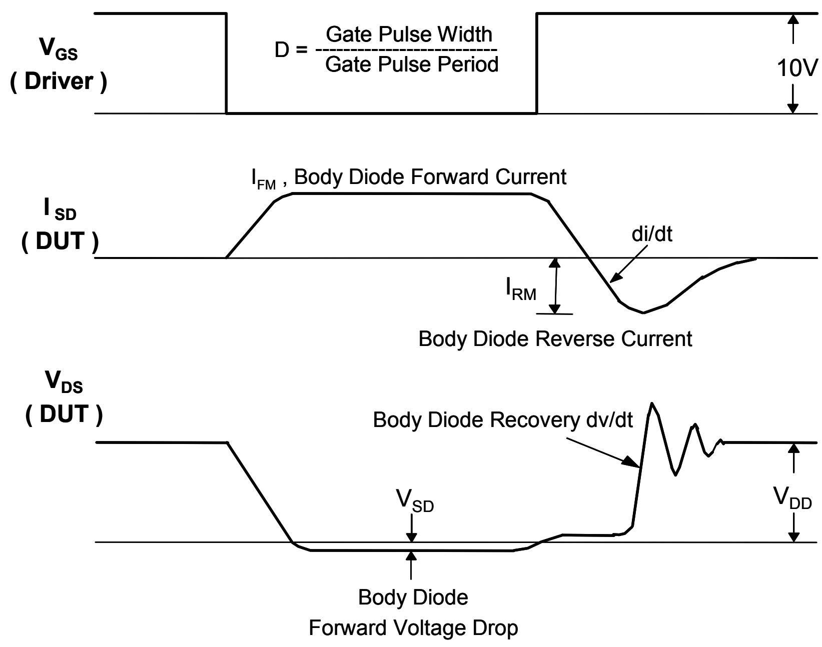


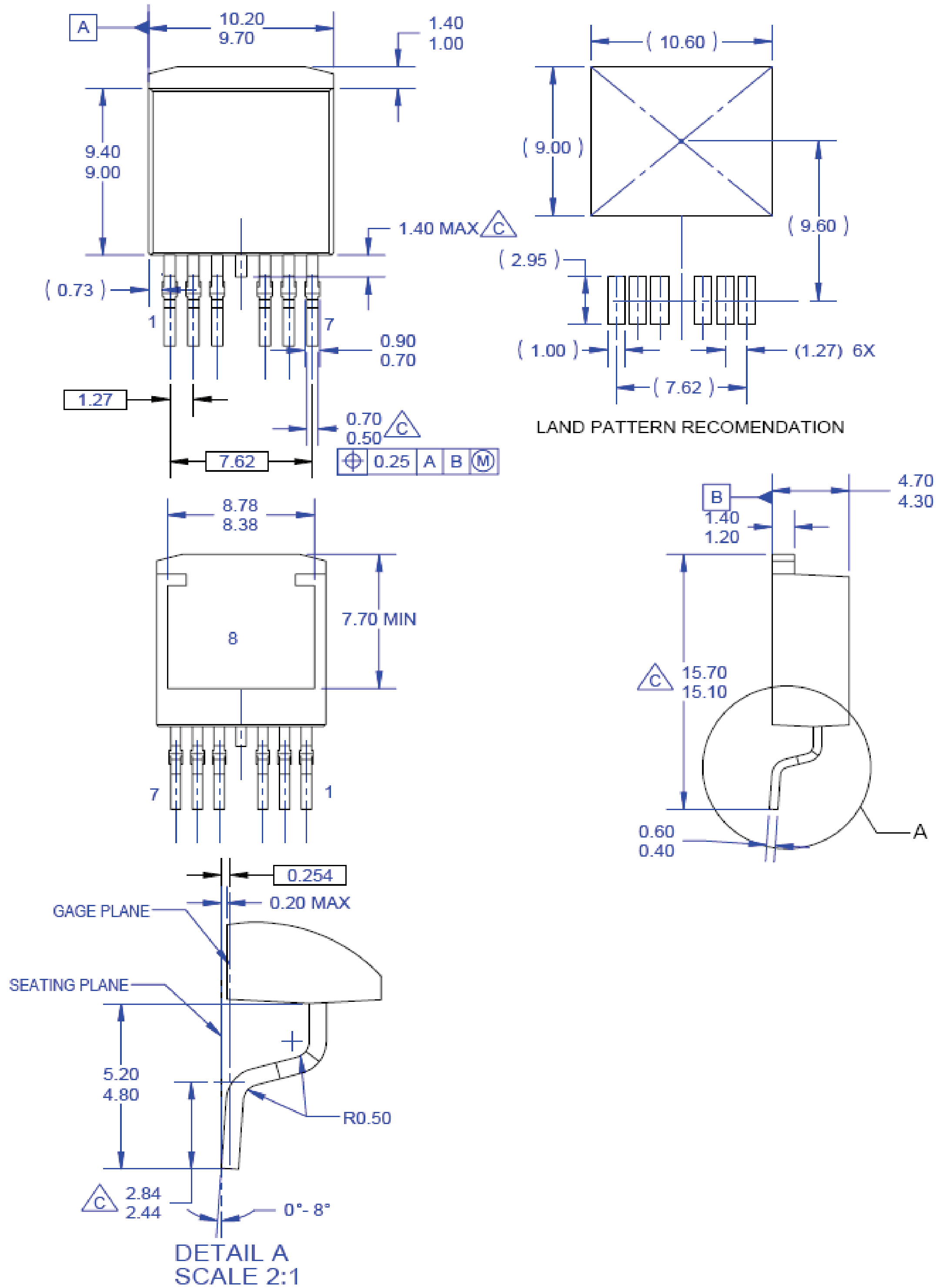
图 **16.** 二极管恢复 **dv/dt** 峰值测试电路与波形





机械尺寸

D^2PAK-7L



尺寸单位为毫米

FAIRCHILD™

TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™
AX-CAP®*
BitSiC™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficentMax™
ESBC™
®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FETBench™
FPS™
F-PFS™
FRFET®
Global Power Resource℠
GreenBridge™
Green FPS™
Green FPS™ e-Series™
*G*max™
GTO™
IntelliMAX™
ISOPLANAR™
Marking Small Speakers Sound Louder and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
mWSaver®
OptoHiT™
OPTOLOGIC®
OPTOPLANAR®
®
PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™
™
Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™
SPM®
STEALTH™
SuperFET®
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™
Sync-Lock™
SYSTEM GENERAL®*
TinyBoost®
TinyBuck®
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TranSiC™
TriFault Detect™
TRUECURRENT®*
μSerDes™
μSerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
VoltagePlus™
XS™
仙童 ™

*Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used here in:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
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.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.Fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufactures of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed application, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handing and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address and warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

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. I68

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative