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FAIRCHILD SEMICONDUCTOR®

2014 年 2 月

FCH041N60E

N 沟道 SuperFET® II Easy-Drive MOSFET

600 V、 77 A、 41 mΩ

特性

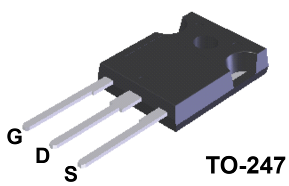
- 650 V @ T_J = 150°C
- 典型值 $R_{DS(on)}$ = 36 mΩ
- 超低栅极电荷 （典型值 Q_g = 285 nC)
- 低有效输出电容 （典型值 $C_{oss(eff.)}$= 735 pF)
- 100% 经过雪崩测试
- 集成栅极电阻
- 符合 RoHS 标准

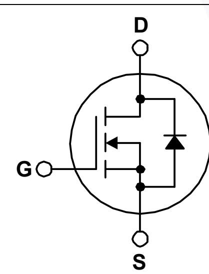
应用

- LCD / LED / PDP 电视灯光
- 光伏逆变器
- AC-DC 电源

说明

SuperFET® II MOSFET 是飞兆半导体新一代利用电荷平衡技术实现出色低导通电阻和更低栅极电荷性能的高压超级结 (SJ) MOSFET 系列产品。这项技术专用于最小化导通损耗并提供卓越的开关性能、dv/dt额定值和更高雪崩能量。类似地，与SuperFET II MOSFET 系列相比，SuperFET II MOSFET Easy-Drive 系列具有略为缓慢的上升和下降时间。该系列产品型号以“E”作为前缀，有助于解决 EMI 问题，设计部署更为简单。如需获得更快的开关速度并用于开关损耗必须尽可能低的应用中，请考虑使用 SuperFET II MOSFET 系列。





绝对最大额定值 T_C = 25°C 除非另有说明。

符号	参数		FCH041N60E	单位
V_{DSS}	漏极－源极电压		600	V
V_{GSS}	栅极－源极电压	- DC	±20	V
		- AC (f > 1 Hz)	±30	
I_D	漏极电流	- 连续 (T_C = 25°C)	77	A
		- 连续 (T_C = 100°C)	48.7	
I_{DM}	漏极电流	- 脉冲 （说明 1）	231	A
E_{AS}	单脉冲雪崩能量 （说明 2）		2025	mJ
I_{AR}	雪崩电流 （说明 1）		15	A
E_{AR}	重复雪崩能量 （说明 1）		5.92	mJ
dv/dt	MOSFET dv/dt		100	V/ns
	二极管恢复 dv/dt 峰值 （说明 3）		20	
P_D	功耗	(T_C = 25°C)	592	W
		- 降低至 25°C 以上	4.74	W/°C
T_J, T_{STG}	工作和存储温度范围		-55 至 +150	°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

热性能

符号	参数	FCH041N60E	单位
$R_{\theta JC}$	结至外壳热阻最大值	0.21	°C/W
$R_{\theta JA}$	结至环境热阻最大值	40	

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
FCH041N60E	FCH041N60E	TO-247	塑料管	不适用	不适用	30 单元

电气特性 TC = 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_{DSS}	漏极一源极击穿电压	I_D = 10 mA, V_{GS} = 0 V, T_C = 25°C	600	-	-	V
		I_D = 10 mA, V_{GS} = 0 V, T_C = 150°C	650	-	-	V
ΔBV_{DSS} / ΔT_J	击穿电压温度系数	I_D = 10mA，参考条件为 25°C	-	0.67	-	V/°C
I_{DSS}	零栅极电压漏极电流	V_{DS} = 480 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 480 V, V_{GS} = 0 V, T_C = 125°C	-	-	10	μA
I_{GSS}	栅极 - 体漏电流	V_{GS} = ±20 V, V_{DS} = 0 V	-	-	±100	nA
导通特性						
$V_{GS(th)}$	栅极阈值电压	V_{GS} = V_{DS}, I_D = 250 μA	2.5	-	3.5	V
$R_{DS(on)}$	漏极至源极静态导通电阻	V_{GS} = 10 V, I_D = 39 A	-	36	41	mΩ
g_{FS}	正向跨导	V_{DS} = 20 V, I_D = 39 A	-	71	-	S
动态特性						
C_{iss}	输入电容	V_{DS} = 100 V, V_{GS} = 0 V, f = 1 MHz	-	10300	13700	pF
C_{oss}	输出电容		-	355	475	pF
C_{rss}	反向传输电容		-	4	6	pF
C_{oss}	输出电容	V_{DS} = 380 V, V_{GS} = 0 V, f = 1 MHz	-	187	-	pF
C_{oss}eff.	有效输出电容	V_{DS} = 0 V 至 480 V, V_{GS} = 0 V	-	735	-	pF
$Q_{g(tot)}$	10 V 的栅极电荷总量	V_{DS} = 380 V, I_D = 39 A, V_{GS} = 10 V （说明 4）	-	285	380	nC
Q_{gs}	栅极 - 源极栅极电荷		-	45	-	nC
Q_{gd}	栅极 - 漏极 " 米勒 " 电荷		-	105	-	nC
ESR	等效串联电阻	f = 1 MHz	-	1.2	-	Ω
开关特性						
$t_{d(on)}$	导通延迟时间	V_{DD} = 380 V, I_D = 39 A, V_{GS} = 10 V, R_G = 4.7 Ω （说明 4）	-	50	110	ns
t_r	开通上升时间		-	50	110	ns
$t_{d(off)}$	关断延迟时间		-	320	650	ns
t_f	关断下降时间		-	85	180	ns
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		-	-	77	A
I_{SM}	漏极 - 源极二极管最大正向脉冲电流		-	-	231	A
V_{SD}	漏极 - 源极二极管正向电压	V_{GS} = 0 V, I_{SD} = 39 A	-	-	1.2	V
t_{rr}	反向恢复时间	V_{GS} = 0 V, I_{SD} = 39 A, dI_F/dt = 100 A/μs	-	590	-	ns
Q_{rr}	反向恢复电荷		-	18	-	μC

注意：

1. 重复额定值：脉冲宽度受限于最大结温。
2. I_{AS} = 15 A， R_G = 25 Ω，启动 T_J = 25°C。
3. I_{SD} ≤ 39 A， di/dt ≤ 200 A/μs， V_{DD} ≤ 380 V，启动 T_J = 25°C。
4. 本质上独立于操作温度。

典型特性

图 1. 导通区域特性

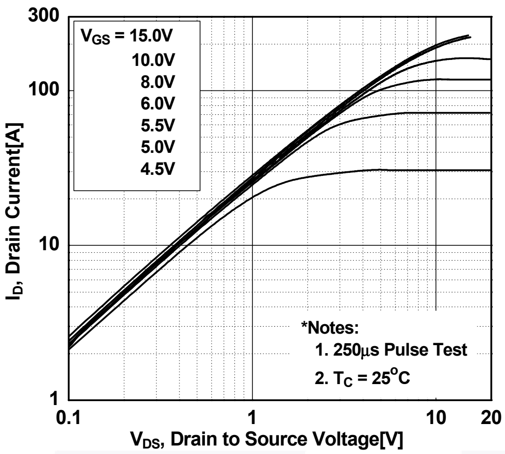


图 2. 传输特性

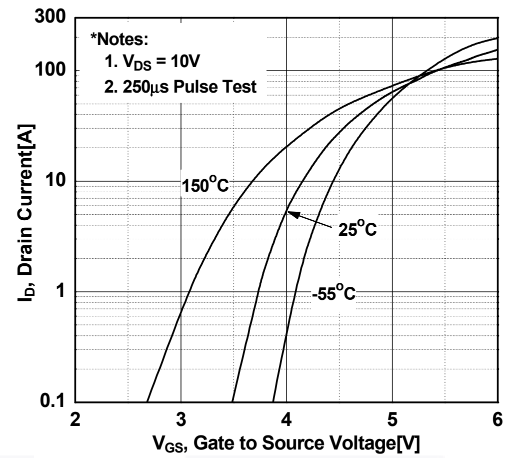


图 3. 导通电阻变化 vs. 漏极电流和栅极电压

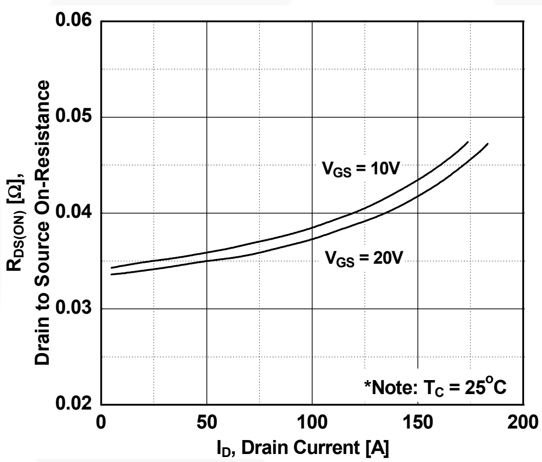


图 4. 体二极管正向电压变化 vs. 源极电流和温度

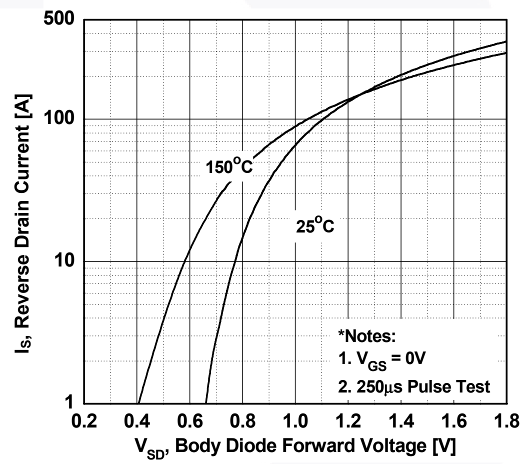


图 5. 电容特性

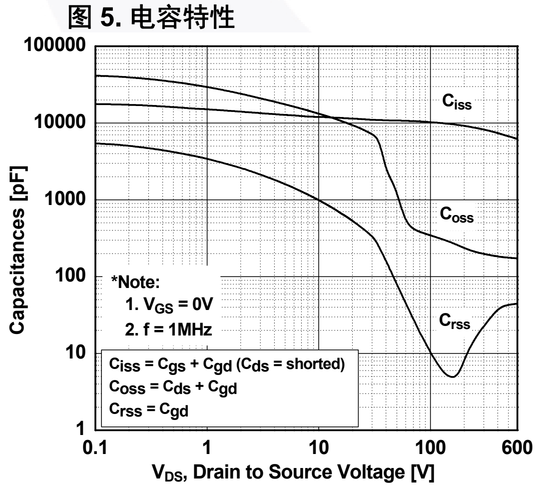
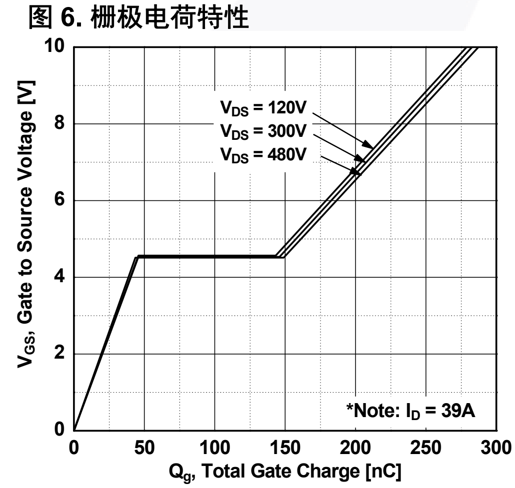


图 6. 栅极电荷特性



典型特征（接上页）

图 7. 击穿电压变化vs. 温度

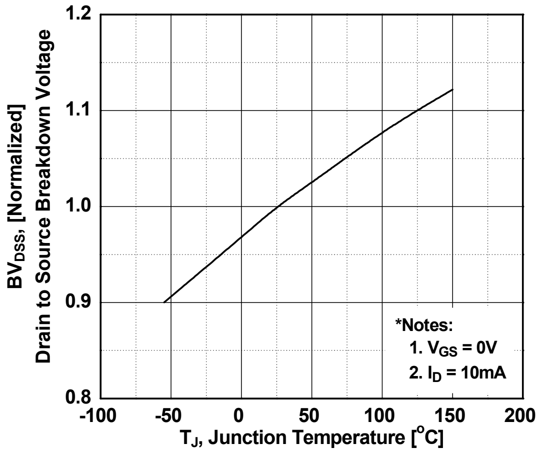


图 8. 导通电阻变化 vs. 温度

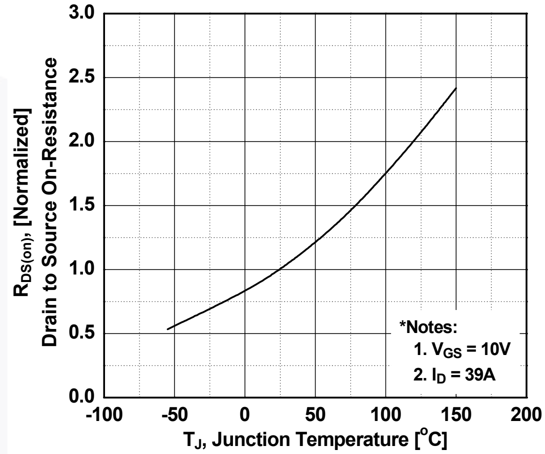


图 9. 最大安全工作区

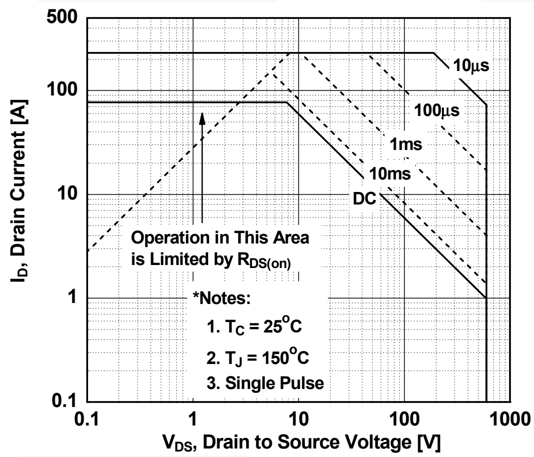


图 10. 最大漏极电流 vs. 外壳温度

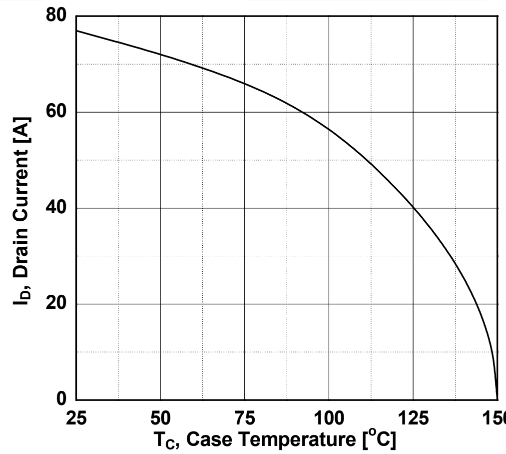
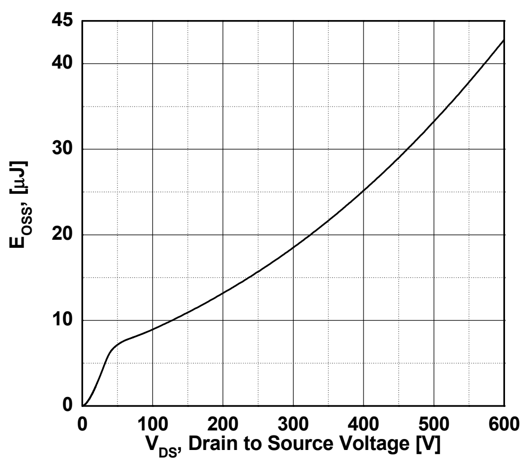
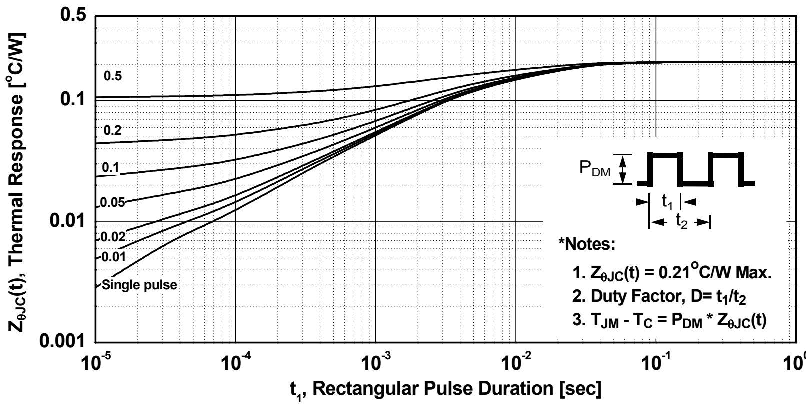


图 11. Eoss 与漏极 - 源极电压的关系



典型特征（接上页）

图 12. 瞬态热响应曲线



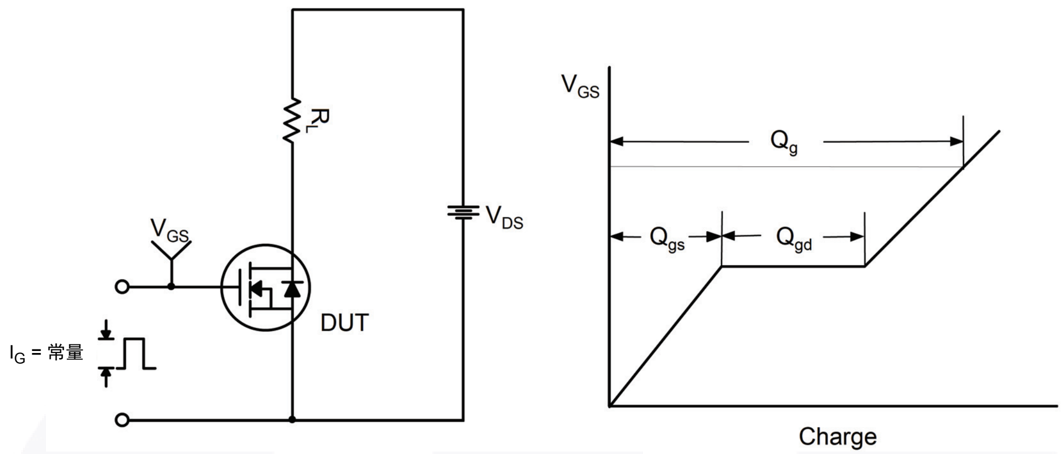


图 13. 栅极电荷测试电路与波形

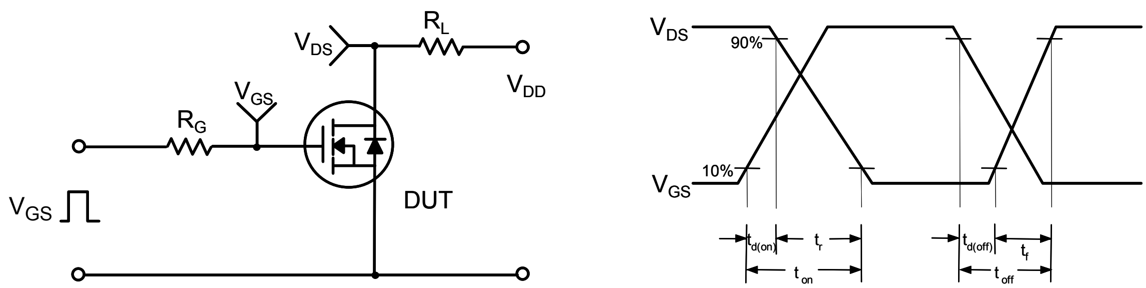


图 14. 阻性开关测试电路与波形

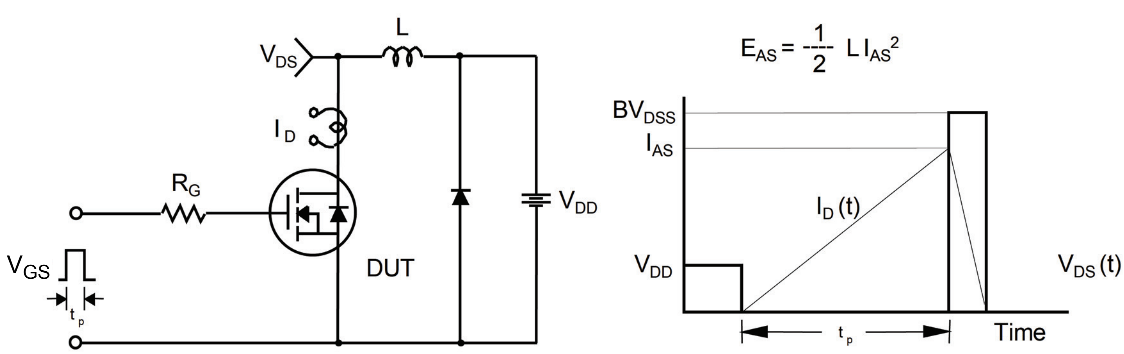


图 15. 非箝位电感开关测试电路与波形

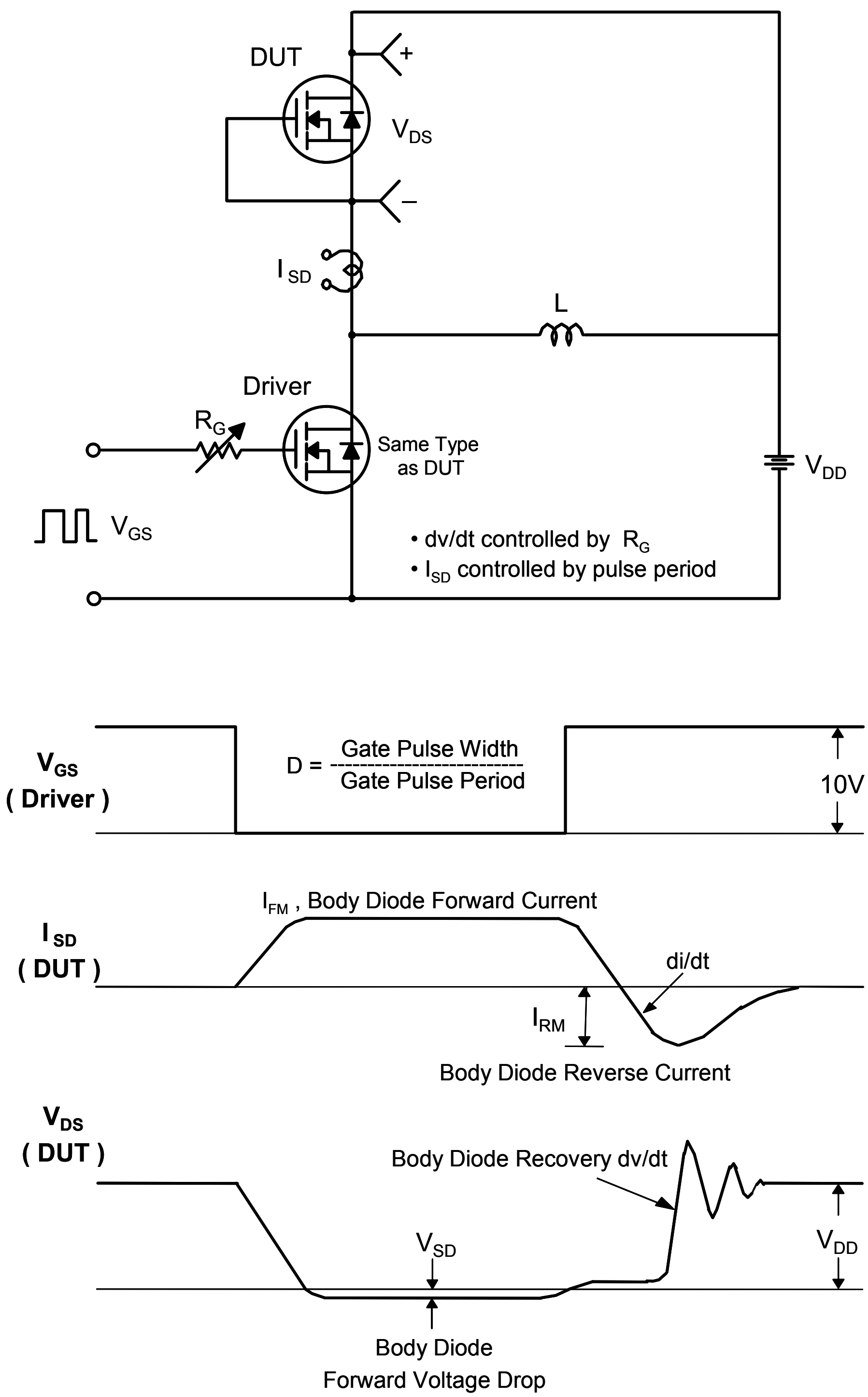


图 16. 二极管恢复 dv/dt 峰值测试电路与波形

机械尺寸

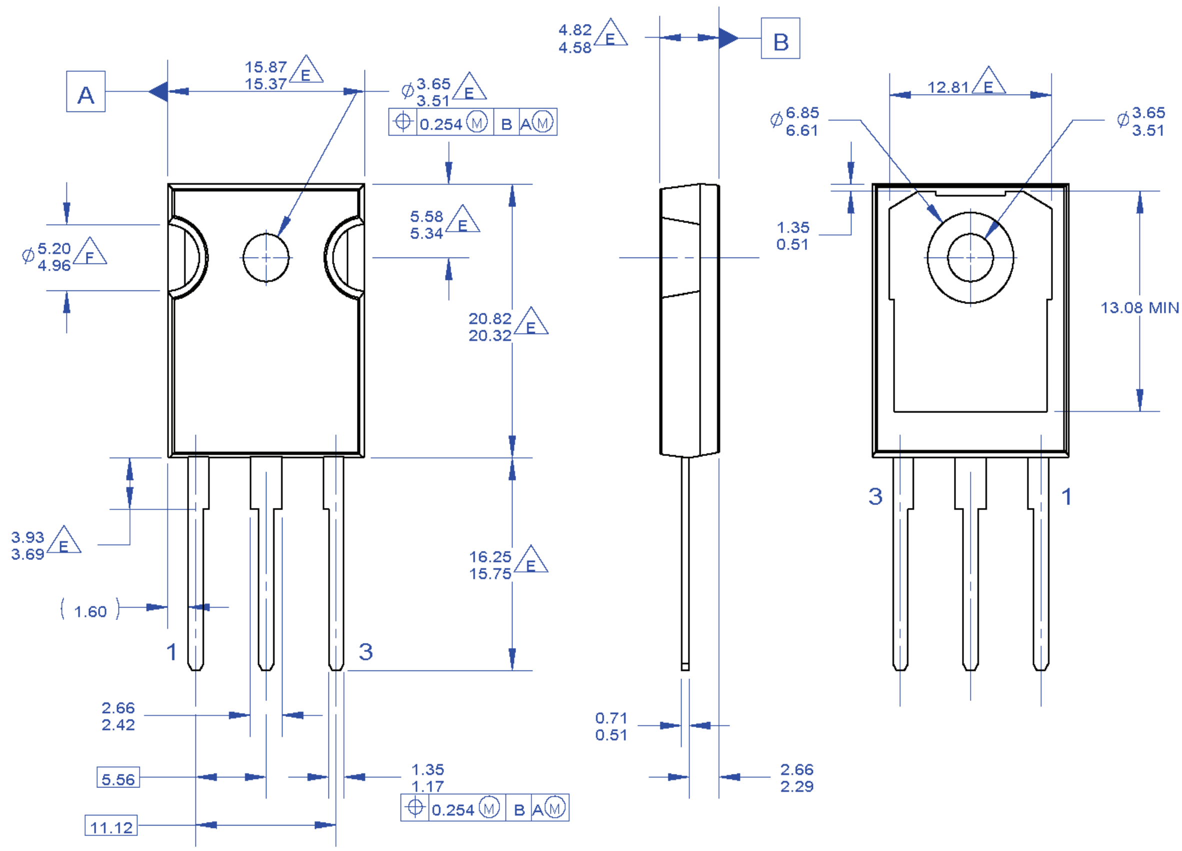


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图 17. TO-247 模塑 3 引线 Jedec 变化 AB

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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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