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FCD380N60E

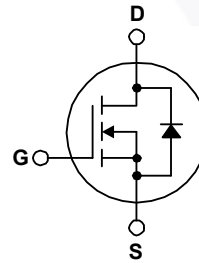
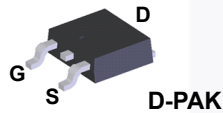
N-Channel SuperFET® II 易驱动 MOSFET 600 V, 10.2 A, 380 mΩ

特性

- 650 V @ $T_J = 150^\circ\text{C}$
- 典型值 $R_{DS(on)} = 320\text{ m}\Omega$
- 超低栅极电荷 (典型值 $Q_g = 34\text{ nC}$)
- 低有效输出电容 (典型值 $C_{oss(eff.)} = 97\text{ pF}$)
- 100% 经过雪崩测试
- 集成栅极电阻
- 符合 RoHS 标准

描述

SuperFET® II MOSFET 是飞兆半导体利用电荷平衡技术实现出色的低导通电阻和更低栅极电荷性能的全新高压超级结 (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。因此, 与 SuperFET II MOSFET 系列相比, SuperFET II MOSFET 易驱动系列提供略为缓慢的上升和下降时间。注意以“E”作为后缀的系列产品有助于控制 EMI 问题和允许更简单的设计执行。对于开关速度很快同时需要开关损耗必须尽可能低的应用, 请考虑使用 SuperFET II MOSFET 系列。



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

符号	参数	FCD380N60E	单位
V_{DSS}	漏极-源极电压	600	V
V_{GSS}	栅极-源极电压	- DC	± 20
		- AC ($f > 1\text{ Hz}$)	± 30
I_D	漏极电流	- 连续 ($T_C = 25^\circ\text{C}$)	10.2
		- 连续 ($T_C = 100^\circ\text{C}$)	6.4
I_{DM}	漏极电流	- 脉冲 (注 1)	30.6
E_{AS}	单脉冲雪崩能量 (注 2)	211.6	mJ
I_{AR}	雪崩电流 (注 1)	2.3	A
E_{AR}	重复雪崩能量 (注 1)	1.06	mJ
dv/dt	MOSFET dv/dt	100	V/ns
	二极管恢复 dv/dt 峰值 (注 3)	20	
P_D	功耗	($T_C = 25^\circ\text{C}$)	106
		- 高于 25°C 的功耗系数	0.85
T_J, T_{STG}	工作和存储温度范围	-55 至 +150	$^\circ\text{C}$
T_L	用于焊接的最大引脚温度, 距离外壳 1/8", 持续 5 秒	300	$^\circ\text{C}$

热性能

符号	参数	FCD380N60E	单位
$R_{\theta JC}$	结至外壳热阻最大值	1.18	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	结至环境热阻最大值	100	

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
FCD380N60E	FCD380N60E	DPAK	卷带	330 mm	16 mm	2500 颗

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	$V_{GS} = 0\text{ V}, I_D = 10\text{ mA}, T_J = 25^\circ\text{C}$	600	-	-	V
		$V_{GS} = 0\text{ V}, I_D = 10\text{ mA}, T_J = 150^\circ\text{C}$	650	-	-	
$\Delta BV_{DSS} / \Delta T_J$	击穿电压温度系数	$I_D = 10\text{ mA}$, 参考 25°C 数值	-	0.67	-	$\text{V}/^\circ\text{C}$
BV_{DS}	漏源极雪崩击穿电压	$V_{GS} = 0\text{ V}, I_D = 10\text{ A}$	-	700	-	V
I_{DSS}	零栅极电压漏极电流	$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}$	-	-	5	μA
		$V_{DS} = 480\text{ V}, T_C = 125^\circ\text{C}$	-	-	20	
I_{GSS}	栅极-体漏电流	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	-	-	± 100	nA

导通特性

$V_{GS(th)}$	栅极阈值电压	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	2.5	-	3.5	V
$R_{DS(on)}$	漏极至源极静态导通电阻	$V_{GS} = 10\text{ V}, I_D = 5\text{ A}$	-	0.32	0.38	Ω
g_{FS}	正向跨导	$V_{DS} = 20\text{ V}, I_D = 5\text{ A}$	-	10	-	S

动态特性

C_{iss}	输入电容	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	1330	1770	pF
C_{oss}	输出电容		-	945	1260	pF
C_{rss}	反向传输电容		-	60	90	pF
C_{oss}	输出电容	$V_{DS} = 380\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	25	-	pF
$C_{oss(eff.)}$	有效输出电容	$V_{DS} = 0\text{ V}$ 至 $480\text{ V}, V_{GS} = 0\text{ V}$	-	97	-	pF
$Q_g(tot)$	10 V 电压的栅极电荷总量	$V_{DS} = 380\text{ V}, I_D = 5\text{ A}, V_{GS} = 10\text{ V}$	-	34	45	nC
Q_{gs}	栅极-源极栅极电荷		-	5.3	-	nC
Q_{gd}	栅极-漏极“米勒”电荷		(注 4)	-	13	-
ESR	等效串联电阻	$f = 1\text{ MHz}$	-	6	-	Ω

开关特性

$t_{d(on)}$	导通延迟时间	$V_{DD} = 380\text{ V}, I_D = 5\text{ A}, V_{GS} = 10\text{ V}, R_g = 4.7\ \Omega$	-	17	44	ns
t_r	导通上升时间		-	9	28	ns
$t_{d(off)}$	关断延迟时间		-	64	138	ns
t_f	关断下降时间		(注 4)	-	10	30

漏极-源极二极管特性

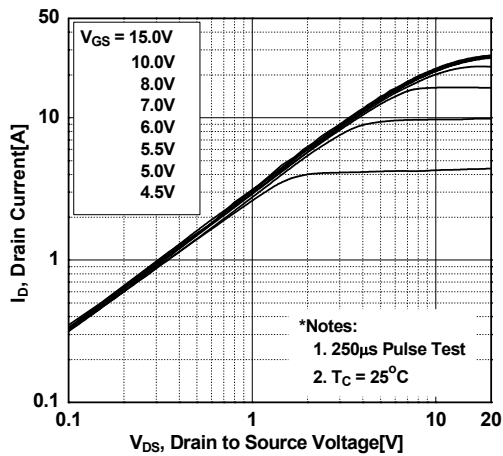
I_S	漏极-源极二极管最大正向连续电流	-	-	10.2	A	
I_{SM}	漏极-源极二极管最大正向脉冲电流	-	-	30.6	A	
V_{SD}	漏极-源极二极管正向电压	$V_{GS} = 0\text{ V}, I_{SD} = 5\text{ A}$	-	-	1.2	V
t_{rr}	反向恢复时间	$V_{GS} = 0\text{ V}, I_{SD} = 5\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	-	240	-	ns
Q_{rr}	反向恢复电荷		-	3	-	μC

注:

- 重复额定值: 脉冲宽度受限于最大结温。
- $I_{AS} = 2.3\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, 开始于 $T_J = 25^\circ\text{C}$ 。
- $I_{SD} \leq 5.1\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, 开始于 $T_J = 25^\circ\text{C}$ 。
- 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

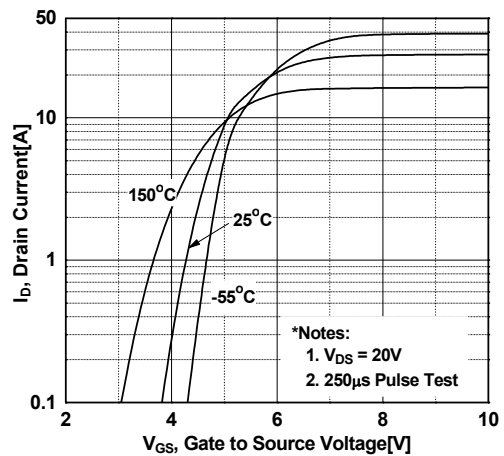


图 3. 导通电阻变化与漏极电流和栅极电压的关系

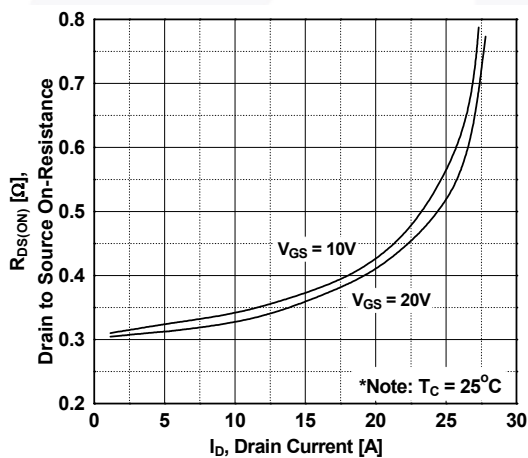


图 4. 体二极管正向电压变化与源极电流和温度的关系

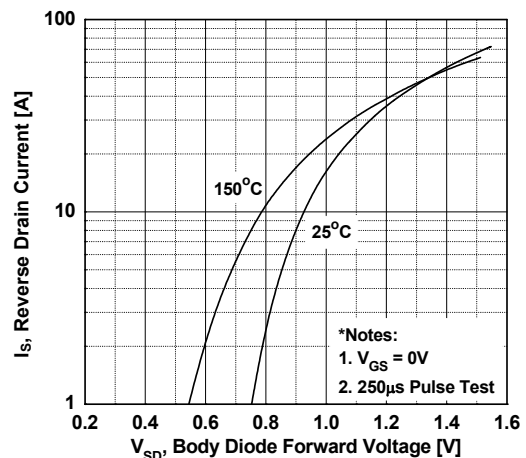


图 5. 电容特性

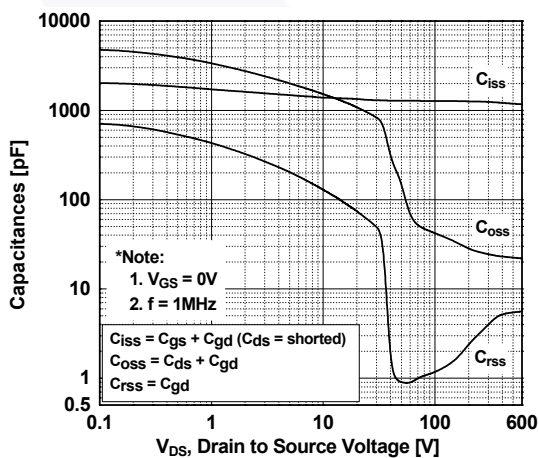
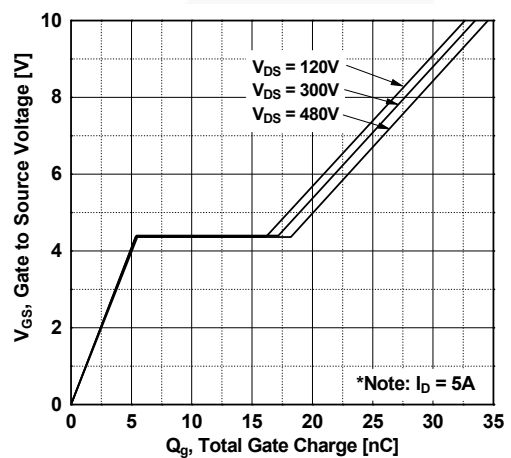


图 6. 栅极电荷特性



典型性能特性 (接上页)

图 7. 击穿电压变化与温度的关系

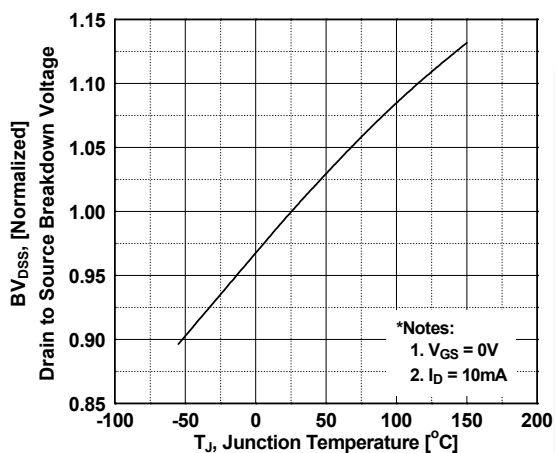


图 8. 导通电阻变化与温度的关系

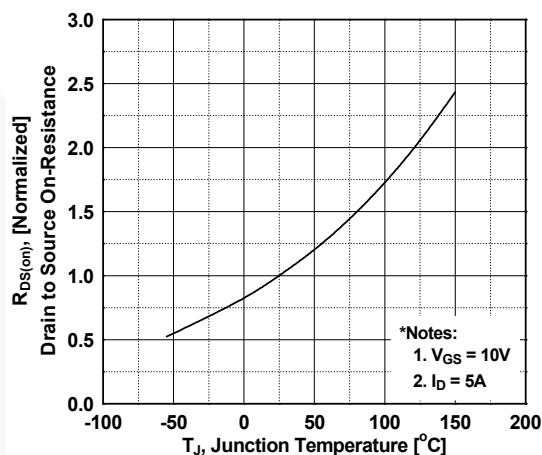


图 9. 最大安全工作区

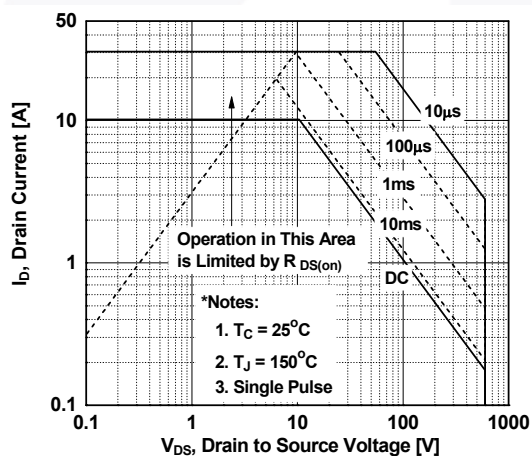


图 10. 最大漏极电流与壳温的关系

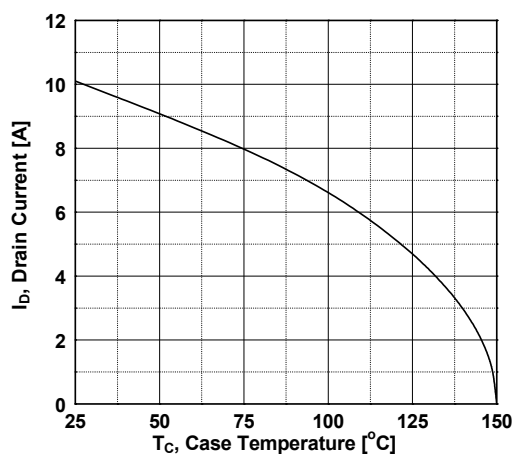
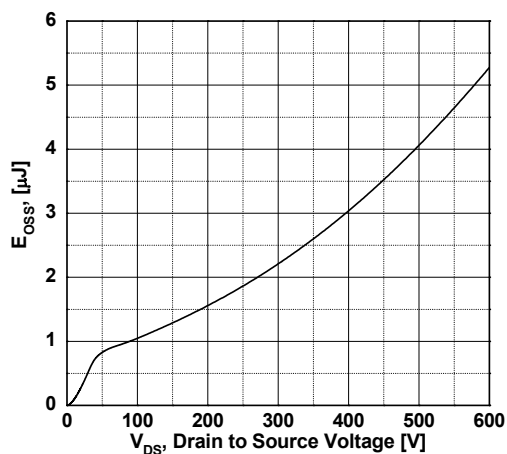
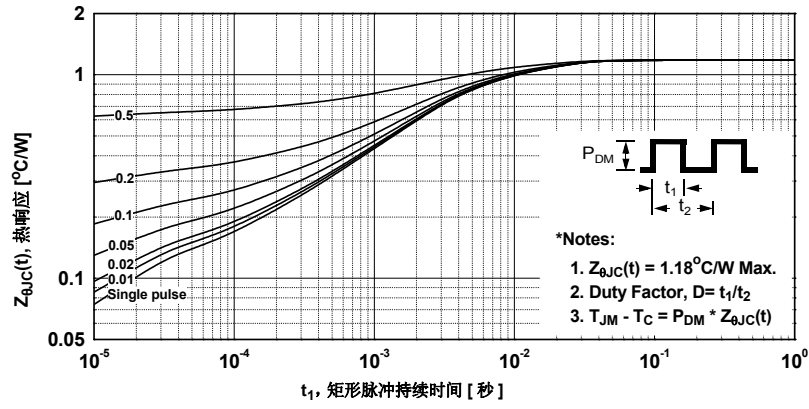


图 11. Eoss 和漏极 - 源极电压的关系



典型性能特性 (接上页)

图 12. 瞬态热响应曲线



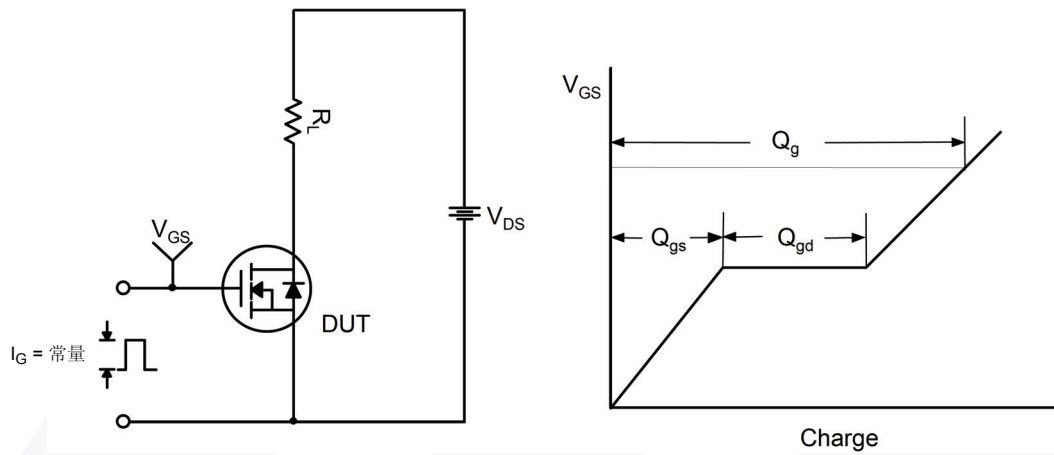


图 13. 栅极电荷测试电路与波形

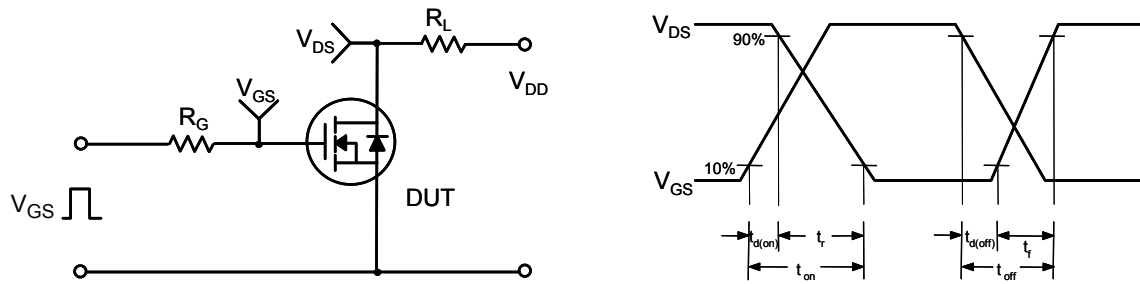


图 14. 阻性开关测试电路与波形

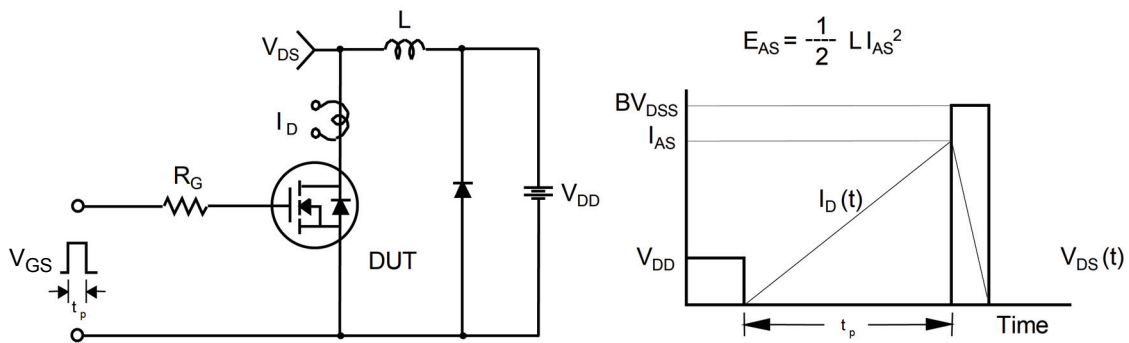


图 15. 非箝位电感开关测试电路与波形

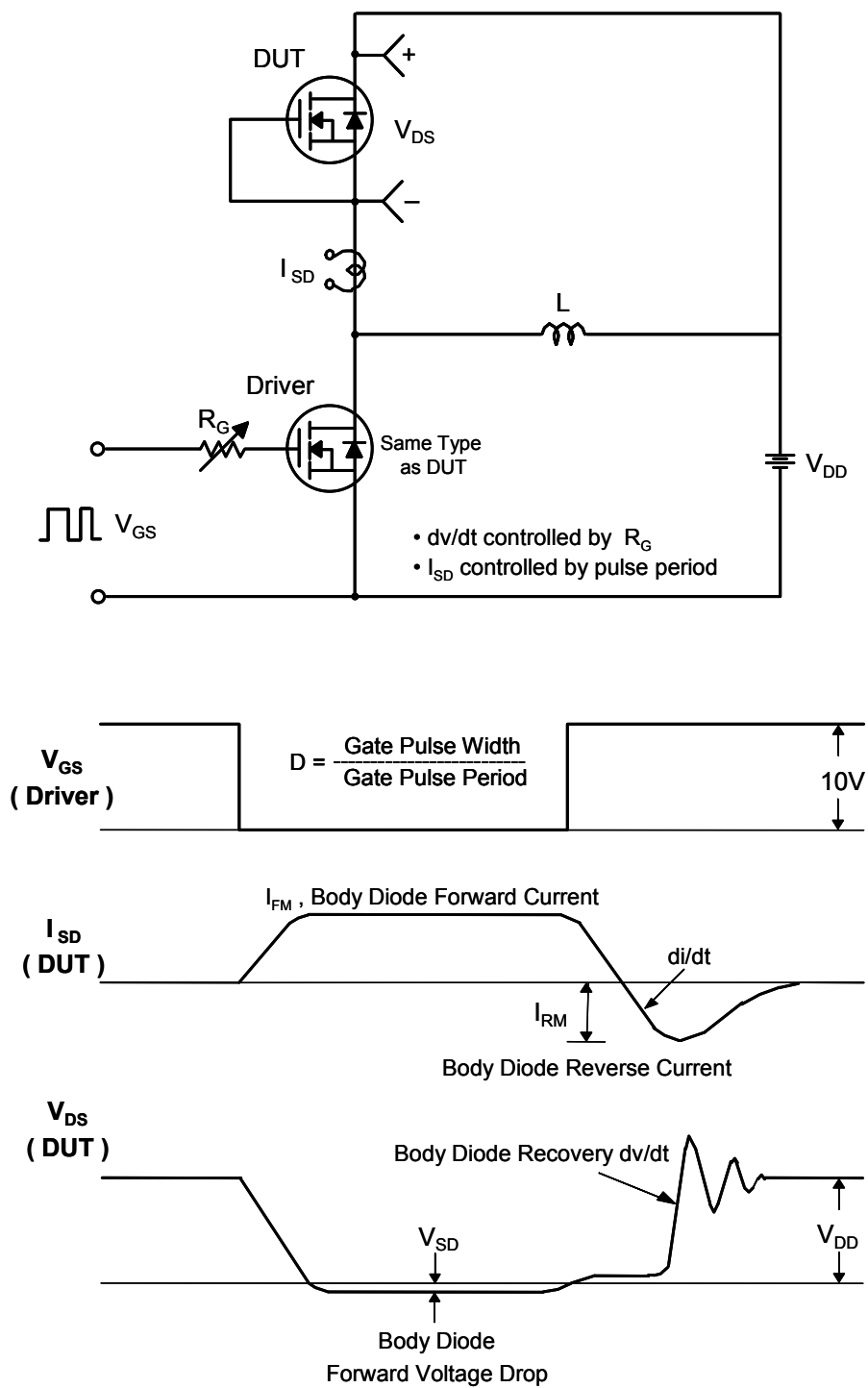


图 16. 二极管恢复 dv/dt 峰值测试电路与波形

机械尺寸

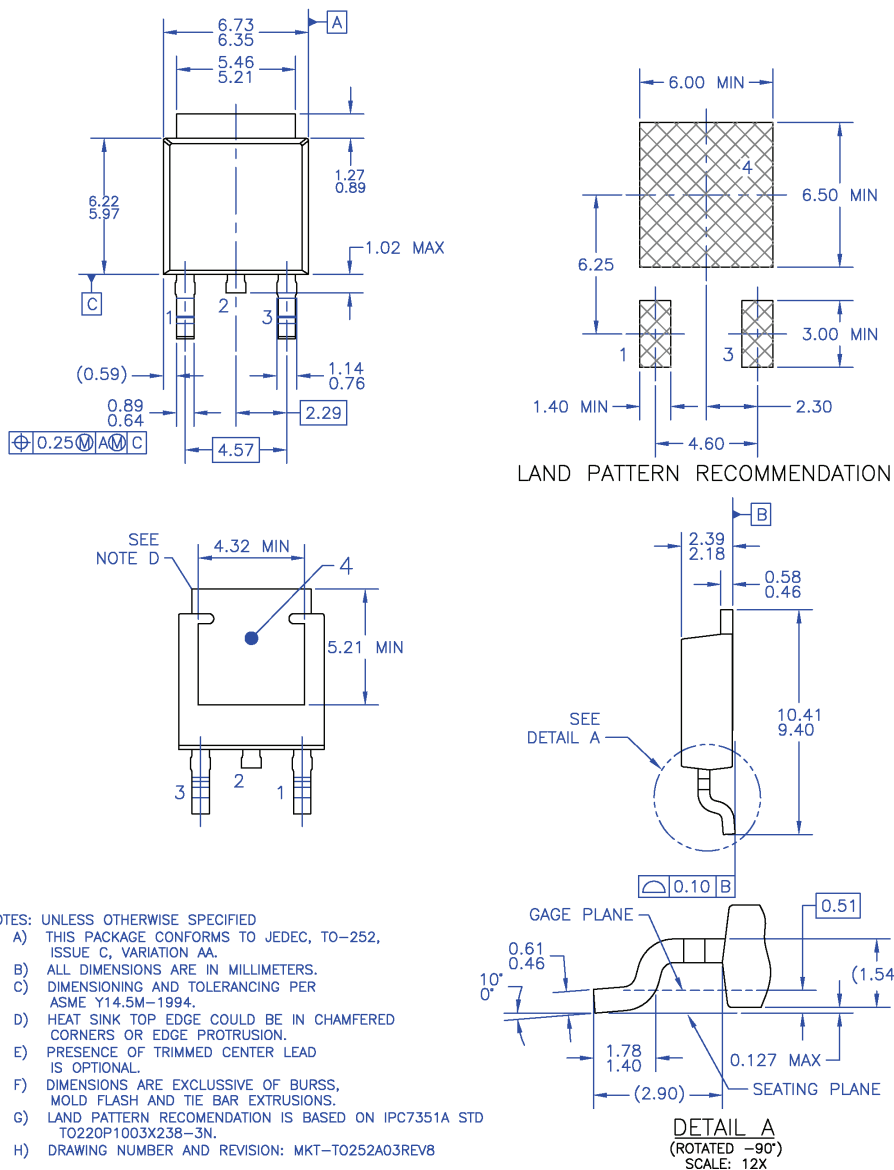


图 17. TO252 (D-PAK), 模塑, 3 引脚, 选项 AA&AB

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