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FCP9N60N / FCPF9N60NT

N 沟道 SupreMOS® MOSFET

600 V, 9 A, 385 mΩ

特性

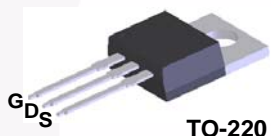
- $R_{DS(on)} = 330\text{ m}\Omega$ (Typ.) @ $V_{GS} = 10\text{ V}$, $I_D = 4.5\text{ A}$
- 超低栅极电荷 (典型值 $Q_g = 22\text{ nC}$)
- 低有效输出电容 (典型值 $C_{oss(eff.)} = 106\text{ pF}$)
- 100% 经过雪崩测试
- 符合 RoHS 标准

应用

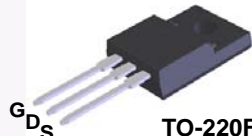
- LCD/LED/PDP 电视
- 照明
- 太阳能逆变器
- AC-DC 电源

说明

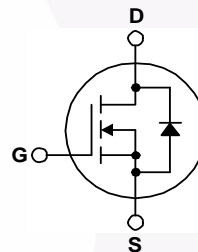
SupreMOS® MOSFET 是飞兆半导体的下一代高压超级结 (SJ) 技术, 该技术采用区别于传统 SJ MOSFET 产品的深沟槽填充工艺。这项先进技术和精密的工艺控制提供了最低的 $R_{sp\ on-resistance}$ (导通电阻规格), 卓越的开关性能和耐用性。SupreMOS MOSFET 产品非常适合高频开关电源转换器应用, 如功率因数校正 (PFC)、服务器 / 电信电源、平板电视电源、ATX 电源及工业电源应用。



TO-220



TO-220F



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

符号	参数	FCP9N60N	FCPF9N60NT	单位
V_{DSS}	漏极-源极电压	600		V
V_{GSS}	栅极-源极电压	±30		V
I_D	漏极电流	-连续 ($T_C = 25^\circ\text{C}$)	9.0	9.0*
		-连续 ($T_C = 100^\circ\text{C}$)	5.7	5.7*
I_{DM}	漏极电流	27	27*	A
E_{AS}	单脉冲雪崩能量	135		mJ
I_{AR}	雪崩电流	3		A
E_{AR}	重复雪崩能量	0.83		mJ
dv/dt	MOSFET dv/dt	100		V/ns
	二极管恢复 dv/dt 峰值	20		V/ns
P_D	功耗	($T_C = 25^\circ\text{C}$)	83.3	29.8
		-超过 25°C 时降额	0.67	0.24
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		$^\circ\text{C}$

*漏极电流受限于最大结温

热性能

符号	参数	FCP9N60N	FCPF9N60NT	单位
$R_{\theta JC}$	结至外壳热阻最大值	1.5	4.2	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	结至环境热阻最大值	62.5	62.5	

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
FCP9N60N	FCP9N60N	TO-220	塑料管	不适用	不适用	50 单元
FCPF9N60NT	FCPF9N60NT	TO-220F	塑料管	不适用	不适用	50 单元

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	$I_D = 1\text{ mA}, V_{GS} = 0\text{ V}, T_C = 25^\circ\text{C}$	600	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	击穿电压温度系数	$I_D = 1\text{ mA}$, 参考 25°C	-	0.72	-	$V/^\circ\text{C}$
I_{DSS}	零栅极电压漏极电流	$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}$	-	-	10	μA
		$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, T_C = 125^\circ\text{C}$	-	-	100	
I_{GSS}	栅极-体漏电流	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	-	-	± 100	nA

导通特性

$V_{GS(th)}$	栅极阈值电压	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	2.0	-	4.0	V
$R_{DS(on)}$	漏极至源极静态导通电阻	$V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}$	-	0.33	0.385	Ω
g_{FS}	正向跨导	$V_{DS} = 40\text{ V}, I_D = 4.5\text{ A}$	-	7.5	-	S

动态特性

C_{iss}	输入电容	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	930	1240	pF
C_{oss}	输出电容		-	35	50	pF
C_{riss}	反向传输电容		-	2	4	pF
C_{oss}	输出电容	$V_{DS} = 380\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	20	-	pF
$C_{oss(eff.)}$	有效输出电容	$V_{DS} = 0\text{ V to } 480\text{ V}, V_{GS} = 0\text{ V}$	-	106	-	pF
$Q_{g(tot)}$	10V 的栅极电荷总量	$V_{DS} = 380\text{ V}, I_D = 4.5\text{ A}, V_{GS} = 10\text{ V}$	-	22.0	29	nC
Q_{gs}	栅极-源极栅极电荷		-	4.1	-	nC
Q_{gd}	栅极-漏极“米勒”电荷 (说明 4)		-	7.1	-	nC
ESR	等效串联电阻 (G-S)	$f = 1\text{ MHz}$	-	2.9	-	Ω

开关特性

$t_{d(on)}$	导通延迟时间	$V_{DD} = 380\text{ V}, I_D = 4.5\text{ A}, V_{GS} = 10\text{ V}, R_G = 4.7\ \Omega$	-	12.7	35.4	ns
t_r	开通上升时间		-	8.7	27.4	ns
$t_{d(off)}$	关断延迟时间		-	36.9	83.8	ns
t_f	关断下降时间 (说明 4)		-	10.2	30.4	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	-	-	9.0	A	
I_{SM}	漏极-源极二极管最大正向脉冲电流	-	-	27	A	
V_{SD}	漏极-源极二极管正向电压	$V_{GS} = 0\text{ V}, I_{SD} = 4.5\text{ A}$	-	-	1.2	V
t_{rr}	反向恢复时间	$V_{GS} = 0\text{ V}, I_{SD} = 4.5\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	-	213	-	ns
Q_{rr}	反向恢复电荷		-	2.2	-	μC

注意:

- 重复额定值: 脉冲宽度受限于最大结温。
- $I_{AS} = 3\text{ A}$, $R_G = 25\ \Omega$, 启动 $T_J = 25^\circ\text{C}$ 。
- $I_{SD} \leq 9\text{ A}$, $di/dt \leq 200\text{ A/ms}$, $V_{DD} = 380\text{ V}$, 启动 $T_J = 25^\circ\text{C}$ 。
- 本质上独立于工作温度的典型特性。

典型性能特征

图 1. 导通区域特性

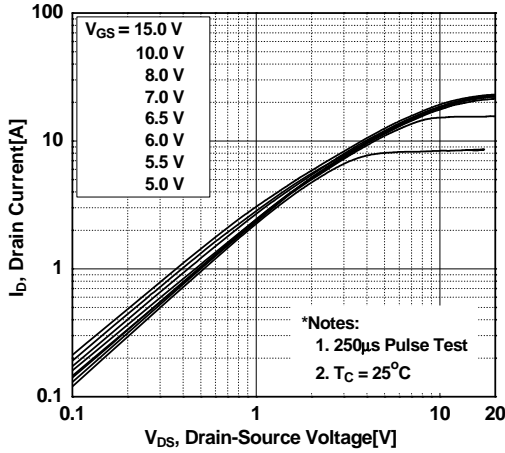


图 2. 传输特性

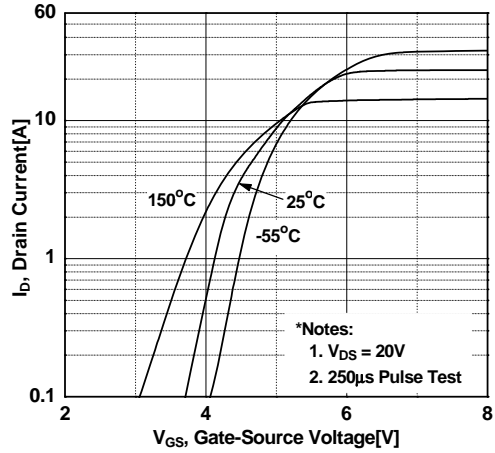


图 3. 导通电阻变化与漏极电流和栅极电压

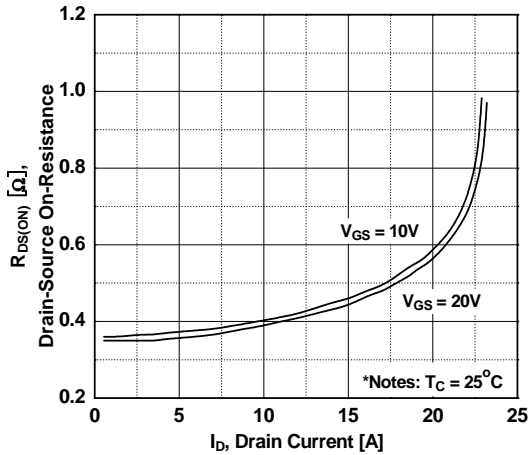


图 4. 体二极管正向电压变化与源电流和温度

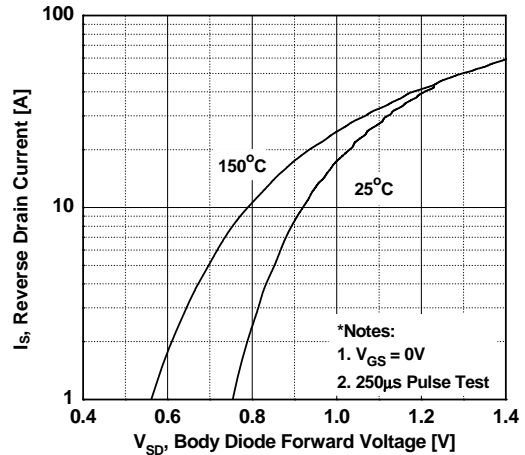


图 5. 电容特性

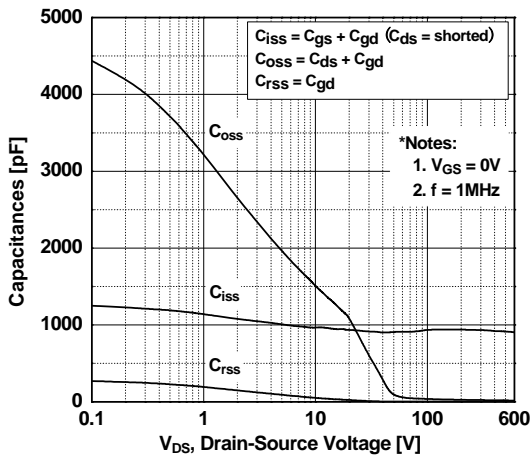
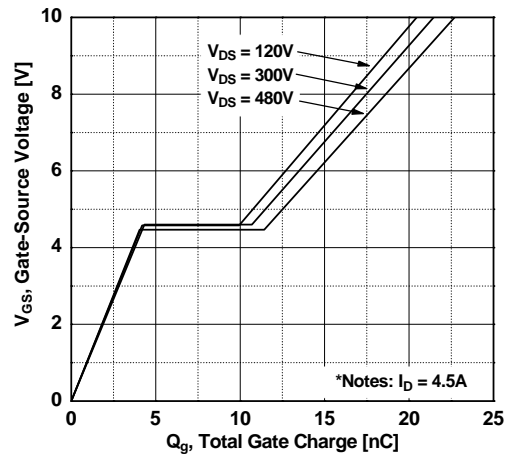


图 6. 栅极电荷



典型性能特征 (接上页)

图 7. 击穿电压变化与温度

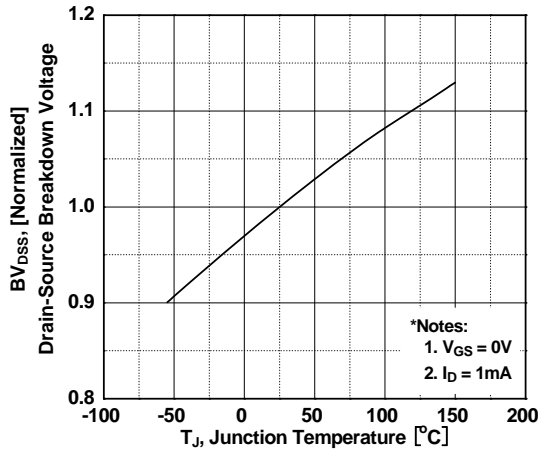


图 8. 导通电阻变化与温度

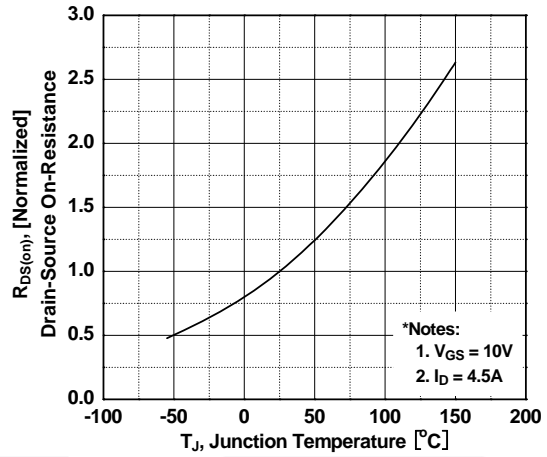


图 9. 最大安全工作区用于 FCPF9N60N

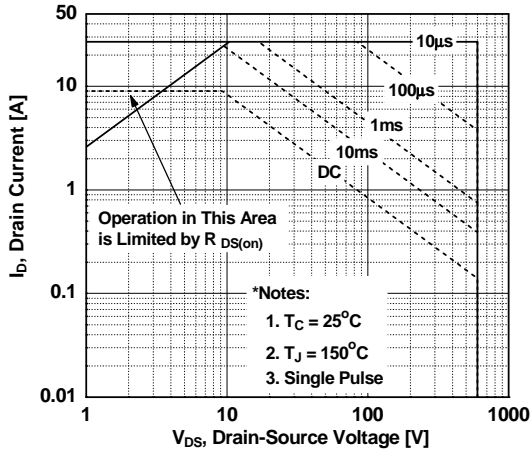


图 10. 最大安全操作区用于 FCPF9N60N

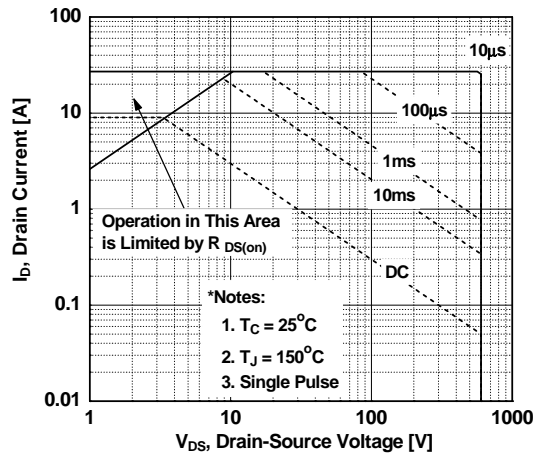
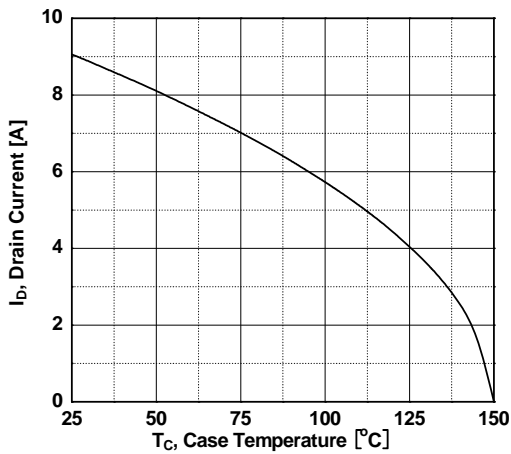


图 11. 最大漏极电流与壳体温度



典型性能特征 (接上页)

图 12. 用于 FCP9N60N 的瞬态热响应曲线

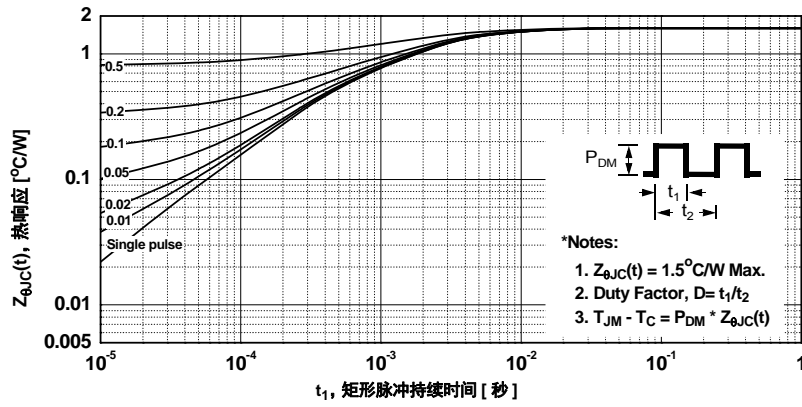
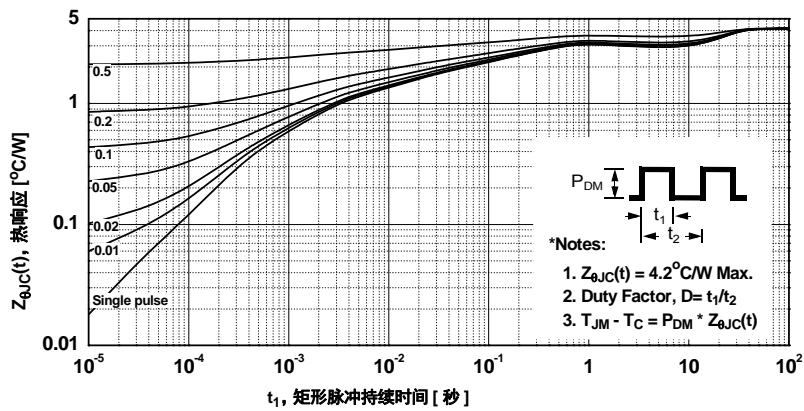


图 13. 用于 FCPF9N60NT 的瞬态热响应曲线



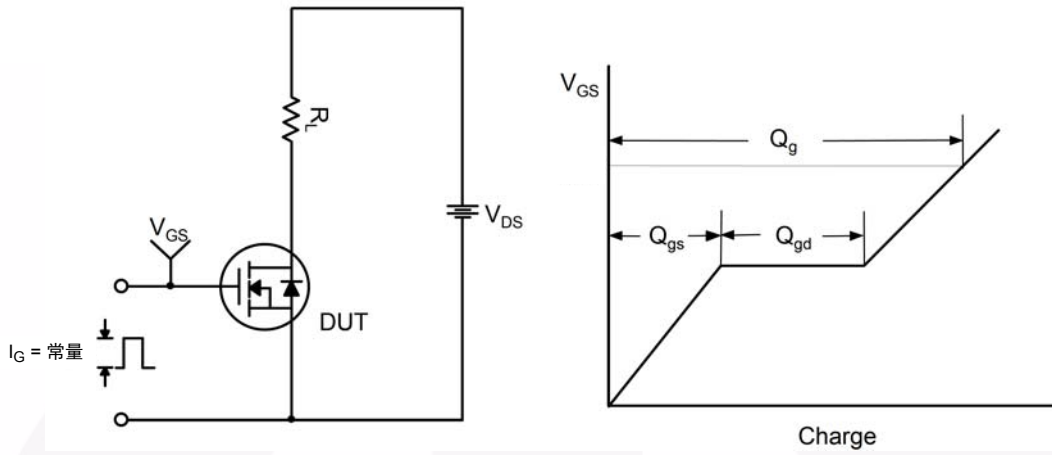


图 14. 栅极电荷测试电路与波形



图 15. 阻性开关测试电路与波形

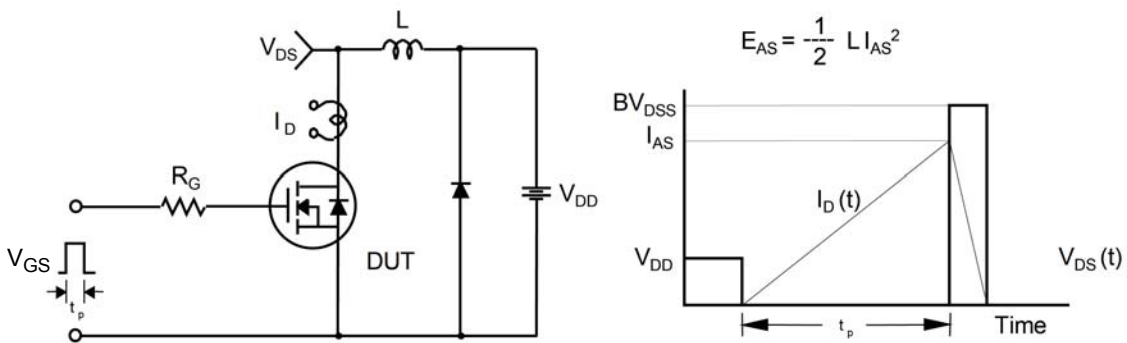


图 16. 非箝位感性开关测试电路与波形

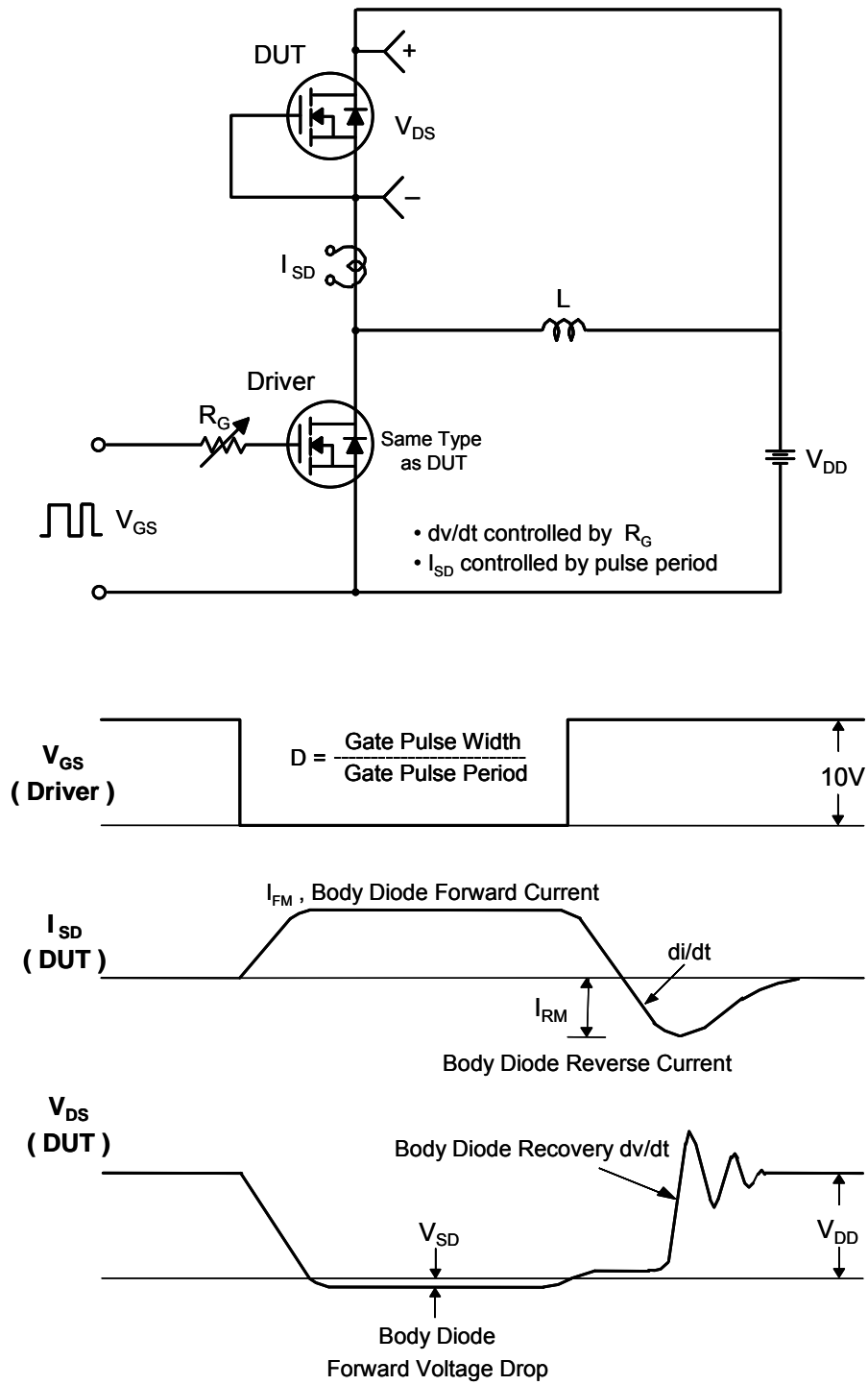


图 17. 二极管恢复 dv/dt 峰值测试电路与波形

机械尺寸

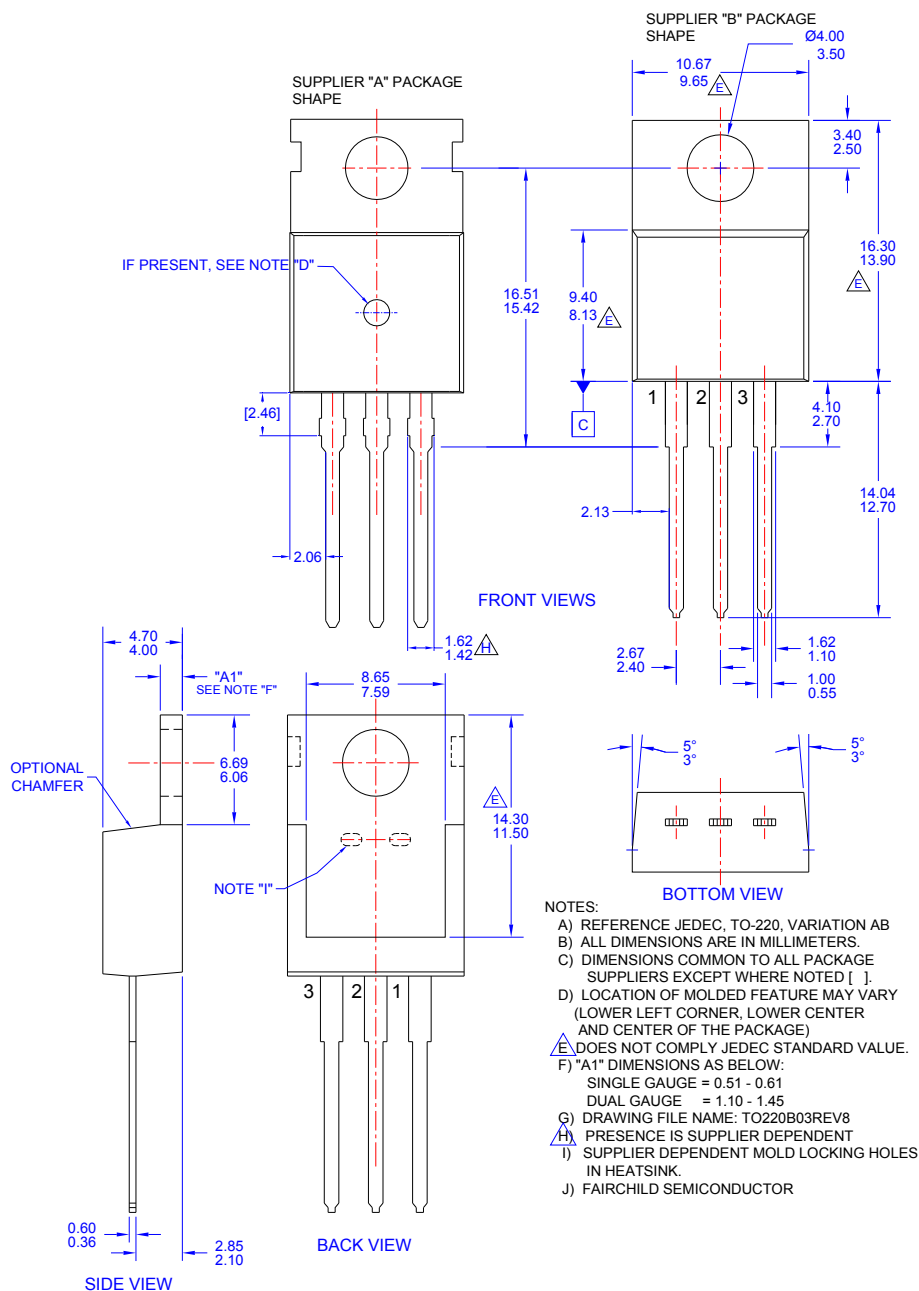


图 18. TO-220, 模塑, 3 引脚, Jeduc Variation AB

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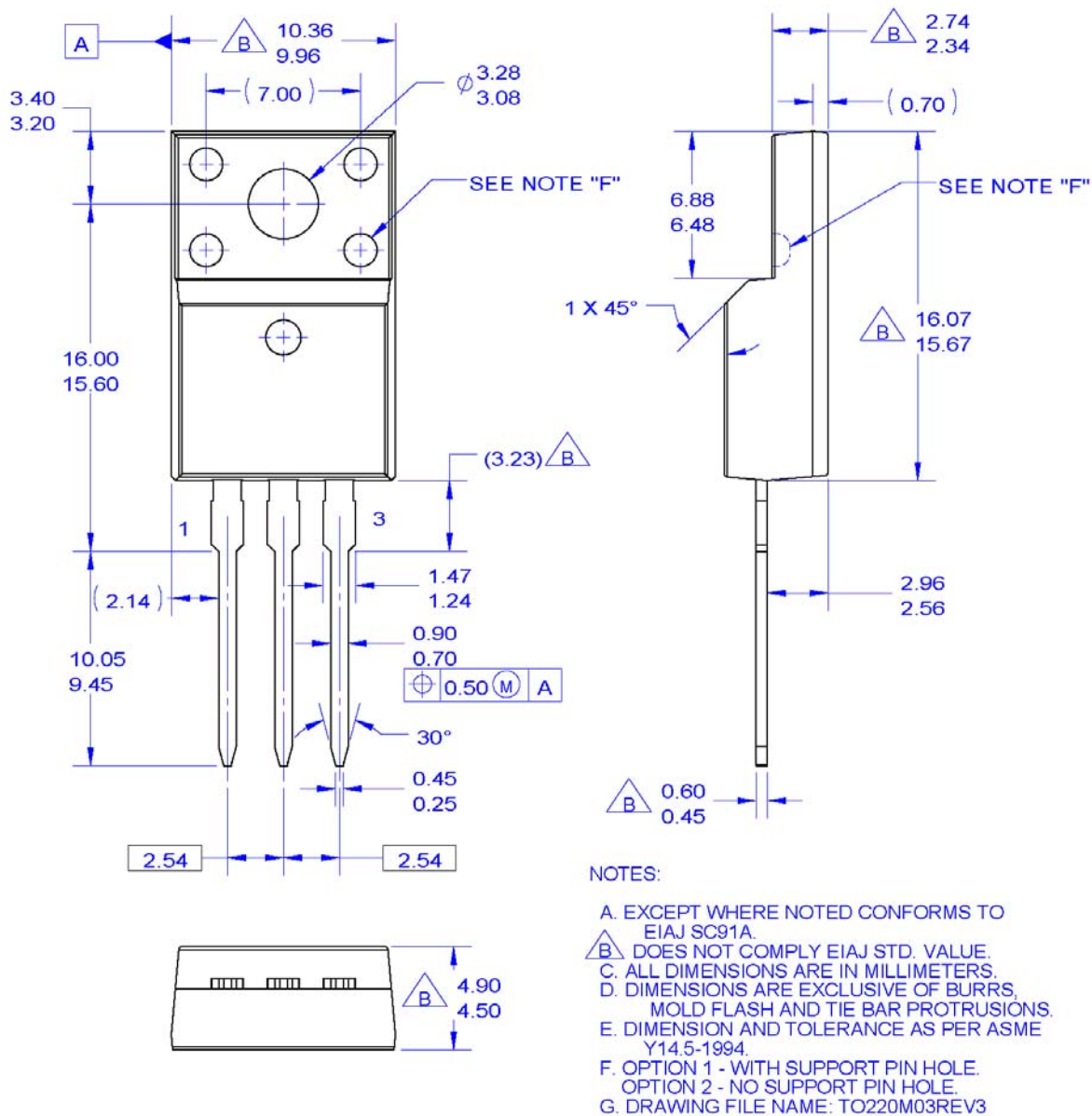


图 19. TO220, 模塑, 3 引脚, 全封装, EIAJ SC91, 直引脚

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