FAIRCHILD SEMICONDUCTOR®

March 2013

FDP10N60NZ / FDPF10N60NZ
N沟道UniFET™ II MOSFET
600 V, 10 A, 750 mΩ

特性

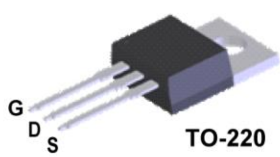
- $R_{DS(on)}$ = 640 mΩ（典型值） @ V_{GS} = 10 V, I_D = 5 A
- 低栅极电荷（典型值 23 nC）
- 低Crss（典型值 10 pF）
- 100%经过雪崩测试
- 改善的dv/dt处理能力
- 增强的 ESD 能力
- 符合 RoHS 标准

应用

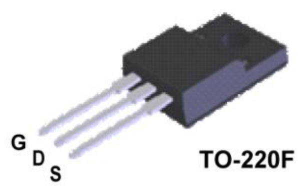
- LCD/ LED/ PDP TV
- 照明
- 不间断电源

说明

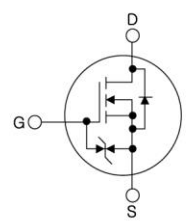
UniFET™ II MOSFET是飞兆半导体®的高压MOSFET系列产品，基于平面条形技术和DMOS技术。该先进MOSFET系列产品在平面 MOSFET 产品中具有最小的通态电阻，还可提供卓越的开关性能和更高的雪崩能量强度。此外，内部的栅源 ESD 二极管使 UniFET™ II MOSFET 产品可承受超过 2kV 的 HBM静电冲击应力。该器件系列适用于开关电源转换器应用，如功率因数校正(PFC)、平板显示器(FPD)电视电源、ATX 及灯用电子镇流器。



TO-220



TO-220F



MOSFET最大额定值 T_C = 25°C，除非另有说明*

符号	参数			FDP10N60NZ	FDPF10N60NZ	单位
V_{DSS}	漏极－源极电压			600		V
V_{GSS}	栅极－源极电压			±25		V
I_D	漏极电流	- 连续 (T_C = 25°C)		10	10*	A
		- 连续(T_C = 100°C)		6	6*	
I_{DM}	漏极电流	- 脉冲	(注 1)	40	40*	A
E_{AS}	单脉冲雪崩能量		(注 2)	550		mJ
I_{AR}	雪崩电流		(注 1)	10		A
E_{AR}	重复雪崩能量		(注 1)	18.5		mJ
dv/dt	二极管恢复dv/dt峰值		(注 3)	10		V/ns
P_D	功耗	(T_C = 25°C)		185	38	W
		- 降低至 25°C 以上		1.5	0.3	W/°C
T_J T_{STG}	工作和存储温度范围			-55 to +150		°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		°C

*漏极电流受限于最大结温

热性能

符号	参数	FDP10N60NZ	FDPF10N60NZ	单位
$R_{\theta JC}$	结至外壳热阻最大值	0.68	3.3	°C/W
$R_{\theta CS}$	外壳与散热体之间的热阻典型值	0.5	-	
$R_{\theta JA}$	结至环境热阻最大值	62.5	62.5	

封装标识与定购信息

器件标识	设备	封装	规格	带宽	数量
FDP10N60NZ	FDP10N60NZ	TO-220	-	-	50
FDPF10N60NZ	FDPF10N60NZ	TO-220F	-	-	50

电气特性 T_C = 25℃，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—源极击穿电压	I_D = 250μA，V_{GS} = 0V，T_J = 25℃	600	-	-	V
$\triangle BV_{DSS}$ / $\triangle T_J$	击穿电压温度系数	I_D = 250μA，推荐选用25℃	-	0.6	-	V/℃
I_{DSS}	零栅极电压漏极电流	V_{DS} = 600V，V_{GS} = 0V	-	-	1	μA
		V_{DS} = 480V，T_C = 125℃	-	-	10	
I_{GSS}	栅极-体漏电流	V_{GS} = ±25V，V_{DS} = 0V	-	-	±10	μA
导通特性						
$V_{GS}(th)$	栅极阈值电压	V_{GS} = V_{DS}，I_D = 250μA	3.0	-	5.0	V
$R_{DS}(on)$	漏极至源极静态导通电阻	V_{GS} = 10V，I_D = 5A	-	0.64	0.75	Ω
g_{FS}	正向跨导	V_{DS} = 20 V，I_D = 5A	-	14	-	S
动态特性						
C_{iss}	直流母线电容值	V_{DS} = 25V· V_{GS} = 0V f = 1MHz	-	1110	1475	pF
C_{oss}	输出电容		-	130	175	pF
C_{rss}	反向传输电容		-	10	15	pF
Q_g	10V的栅极电荷总量	V_{DS} = 480V，I_D = 10A V_{GS} = 10V （说明4）	-	23	30	nC
Q_{gs}	栅极 - 源极栅极电荷		-	6	-	nC
Q_{gd}	栅极-漏极“密勒”电荷		-	8	-	nC
开关特性						
$t_{d(on)}$	导通延迟时间	V_{DD} = 300V，I_D = 10A R_G = 25Ω （说明4）	-	25	60	ns
t_r	开通上升时间		-	50	110	ns
$t_{d(off)}$	关断延迟时间		-	70	150	ns
t_f	关断下降时间		-	50	110	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		-	-	10	A
I_{SM}	漏极 - 源极二极管最大正向脉冲电流		-	-	40	A
V_{SD}	漏极 - 源极二极管正向电压	V_{GS} = 0V，I_{SD} = 10A	-	-	1.4	V
t_{rr}	反向恢复时间	V_{GS} = 0V，I_{SD} = 10A dI_F/dt = 100A/μs	-	300	-	ns
Q_{rr}	反向恢复电荷		-	2	-	μC

注意：

1. 重复率额定值：脉冲宽度受限于最大结温
2. L = 11mH，I_{AS} = 10A，V_{DD} = 50V，R_G = 25Ω，开始T_J = 25°C
3. I_{SD} ≤10A，di/dt＜200A/μs，V_{DD} ≤ BV_{DSS}，开始T_J = 25°C
4. 本质上独立于操作温度的典型特性

典型性能特征

图1. 通态区域特性

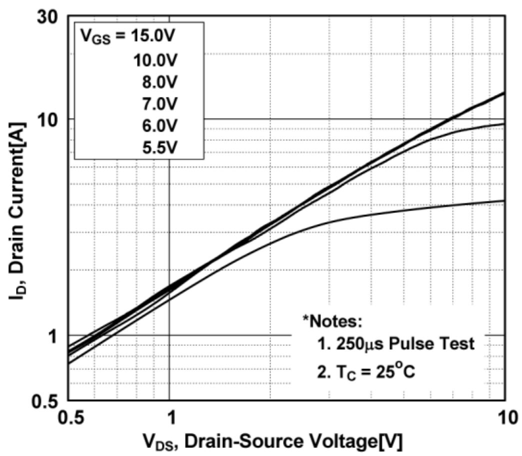


图2. 传递特性

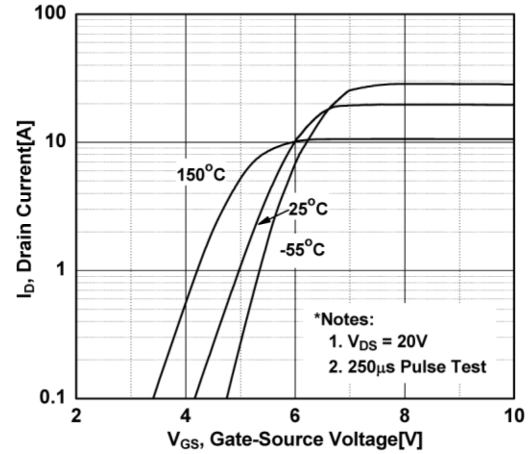


图3. 通态变化与
漏极电流和栅极电压

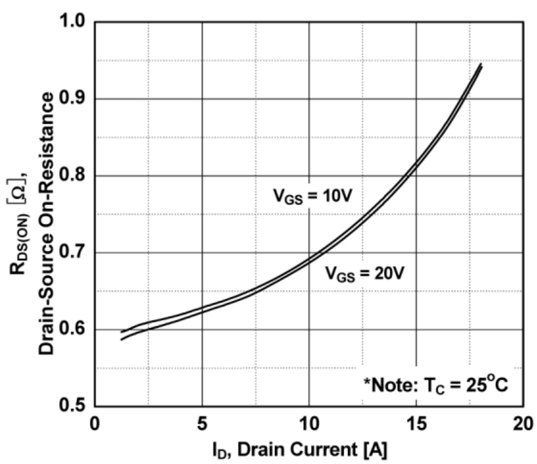


图4. 体二极管正向电压
变化与 源极电流
和温度

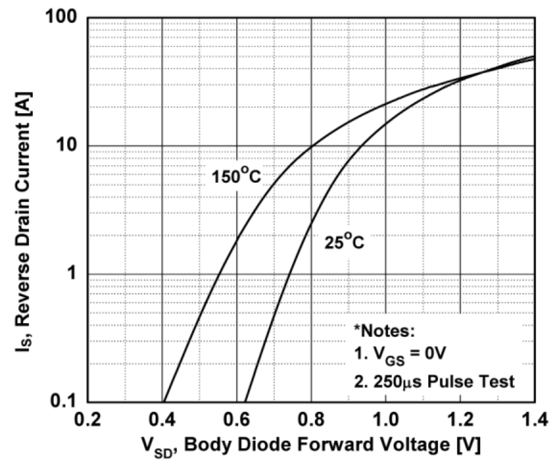


图5. 电容特性

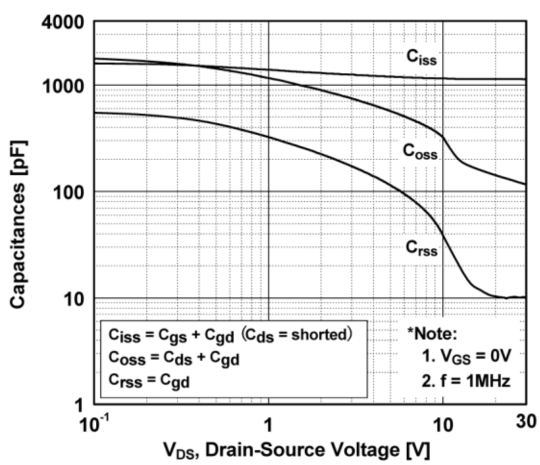
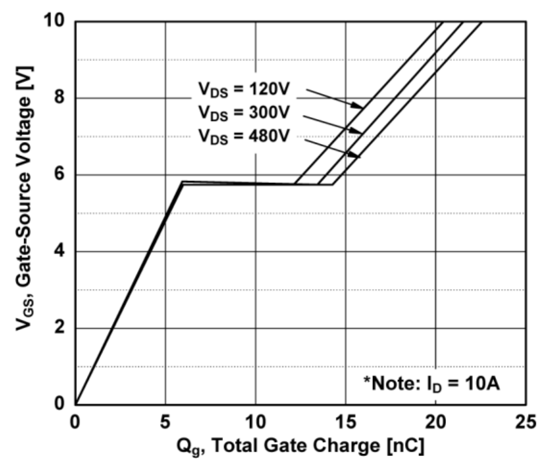


图6. 栅极电荷特性



典型性能特征（接上页）

图7. 击穿电压变化
vs 温度

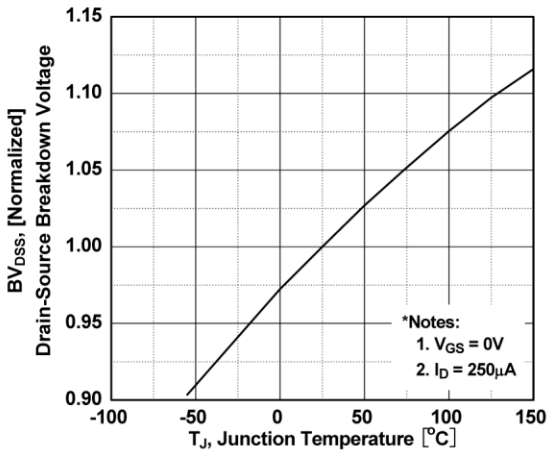


图8. 通态变化
vs 温度

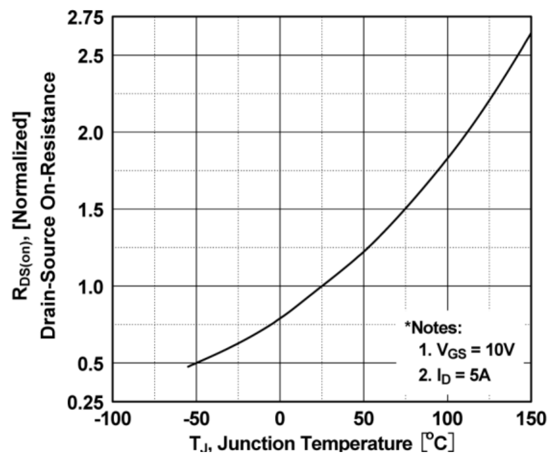


图9. 最大安全操作区
-FDP10N60NZ

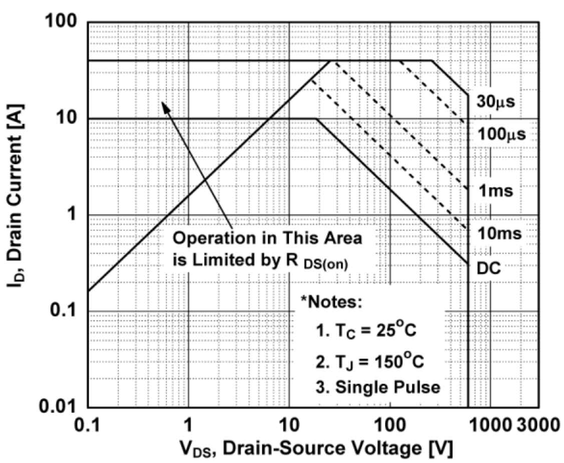


图10. 最大安全工作区
-FDPF10N60NZ

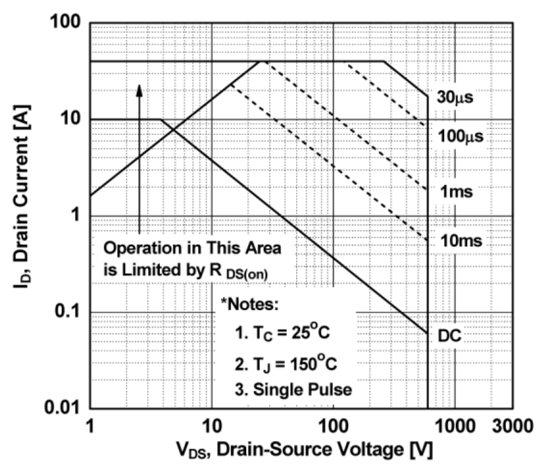
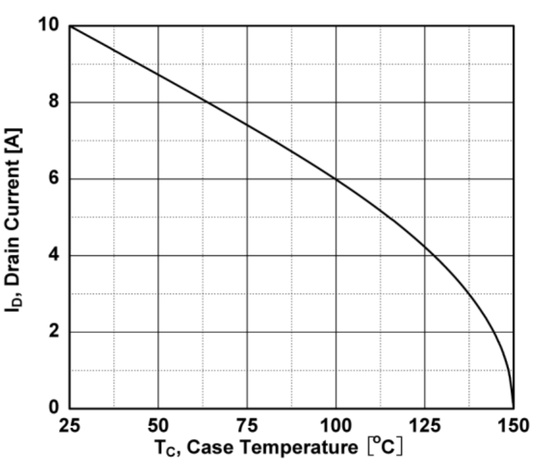


图11. 最大漏极电流与 壳体温度



典型性能特征 （接上页）

图12. 瞬态热响应曲线 -FDP10N60NZ

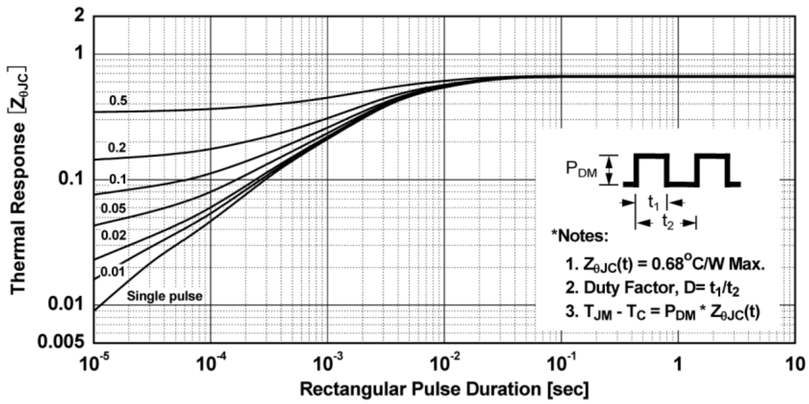
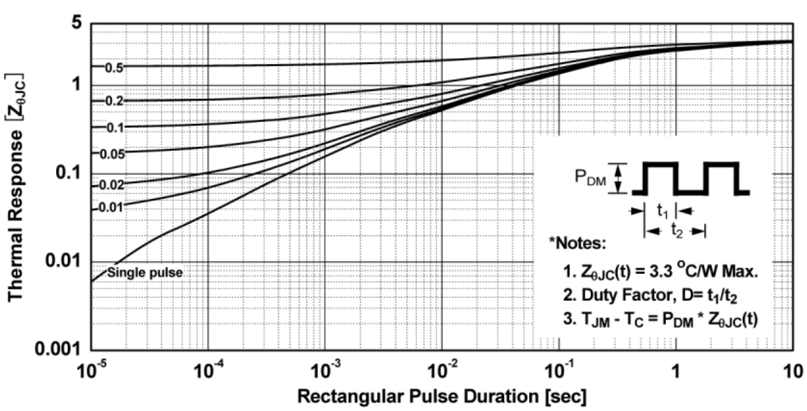
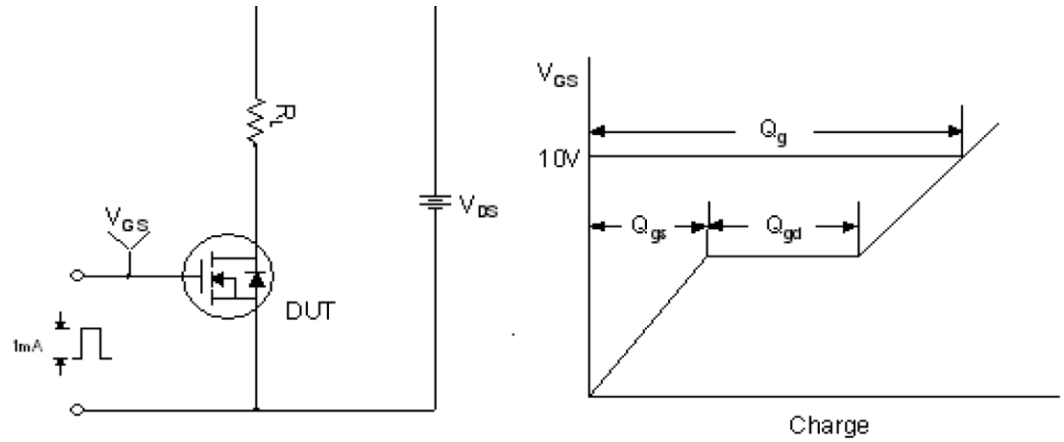


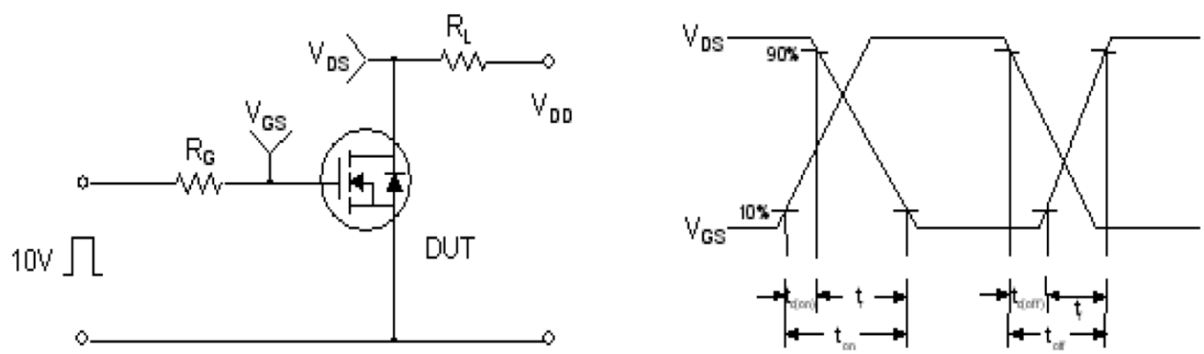
图13. 瞬态热响应曲线 -FDPF10N60NZ



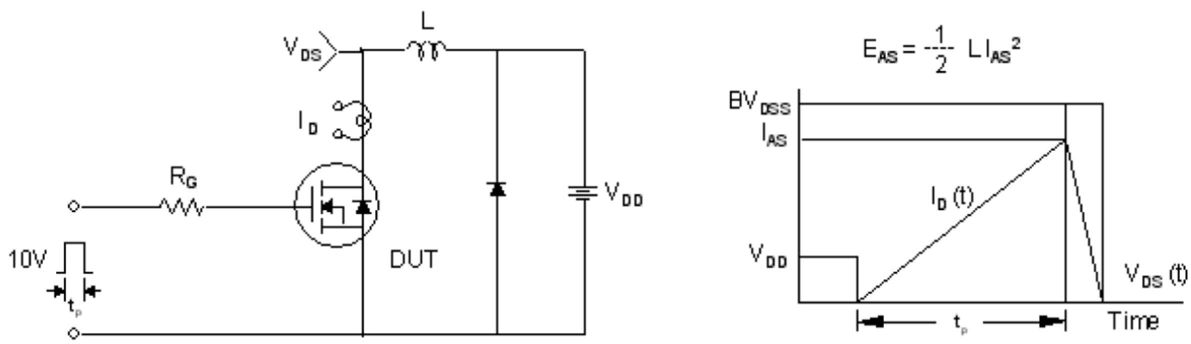
栅极电荷测试电路与波形



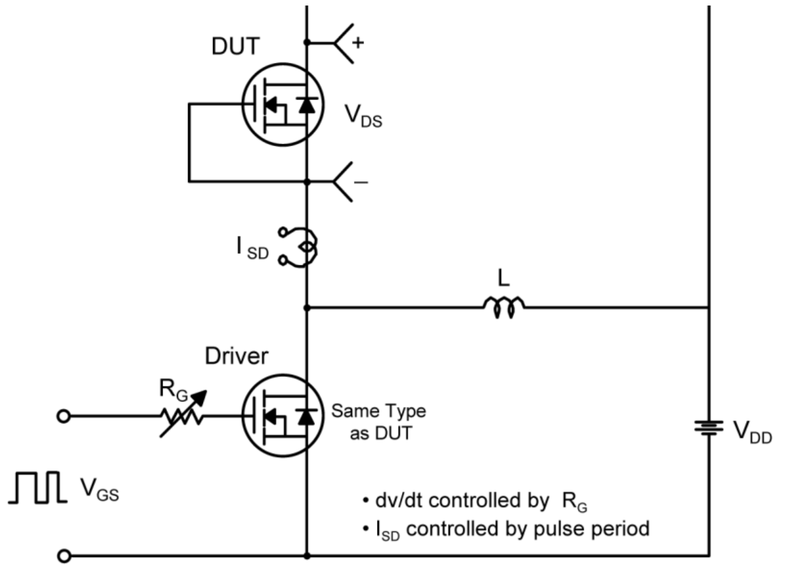
阻性开关测试电路与波形

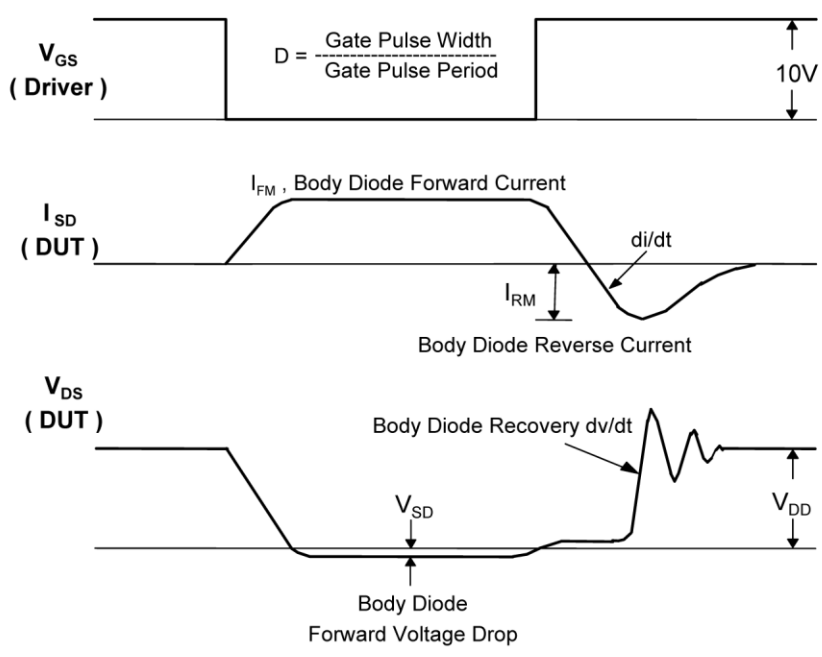


非箝位感性开关测试电路与波形



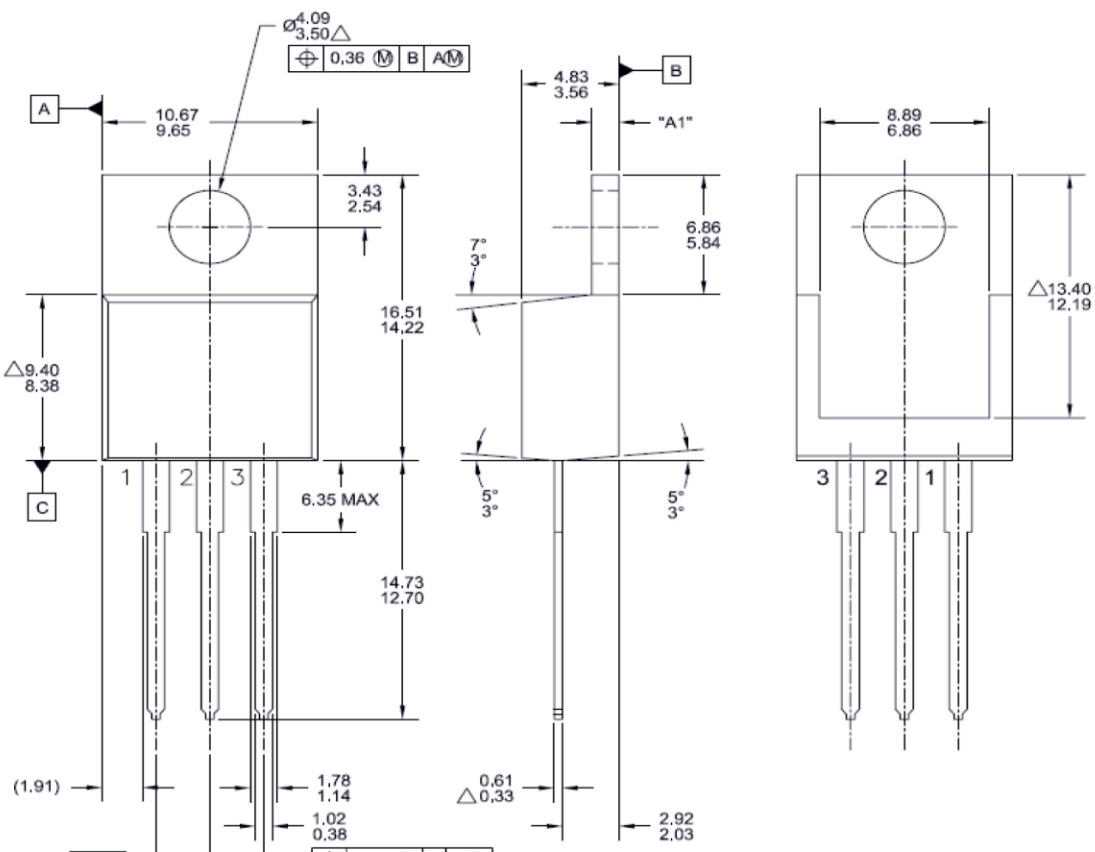
二极管恢复dv/dt峰值测试电路与波形

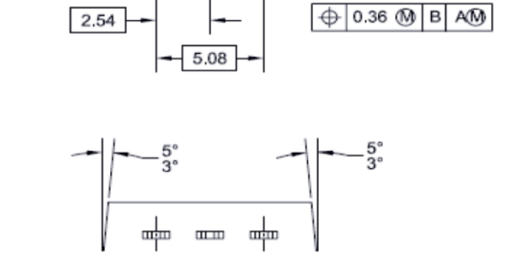




机械尺寸

TO-220B03



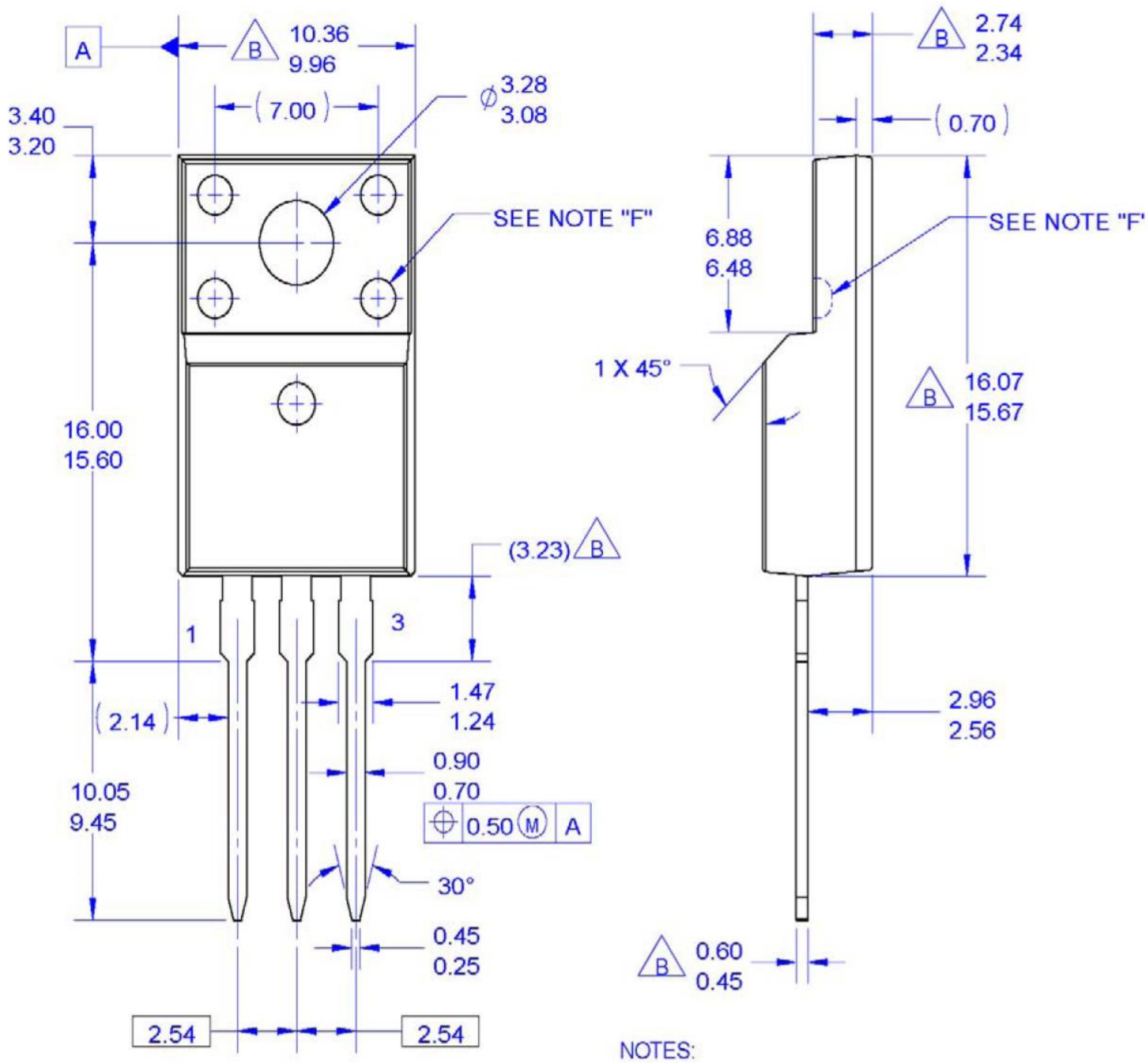


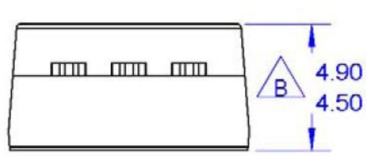
NOTES: UNLESS OTHERWISE SPECIFIED
A) REFERENCE JEDEC, TO-220, ISSUE K, VARIATION AB, DATED APRIL, 2002.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ANSI Y14,5 - 1973
D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
E) DOES NOT COMPLY JEDEC STANDARD VALUE,
F) "A1" DIMENSIONS REPRESENT LIKE BELOW: SINGLE GAUGE = 0.51 - 0.61

尺寸单位为毫米

封装尺寸

TO-220M03





NOTES:

A. EXCEPT WHERE NOTED CONFORMS TO
EIAJ SC91A.
B. DOES NOT COMPLY EIAJ STD. VALUE.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
E. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
F. OPTION 1 - WITH SUPPORT PIN HOLE.
OPTION 2 - NO SUPPORT PIN HOLE.
G. DRAWING FILE NAME: TO220M03REV3

尺寸单位为毫米

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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.

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