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FDP18N50 / FDPF18N50 / FDPF18N50T

N-Channel UniFET™ MOSFET 500 V, 18 A, 265

m Features

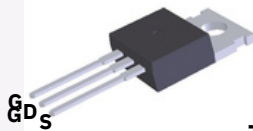
- $R_{DS(on)} = 220\text{ m} (\text{Typ.}) @ V_{GS} = 10\text{ V}, I_D = 9\text{ A}$
- Low Gate Charge (Typ. 45 nC)
- Low C_{rss} (Typ. 25 pF)
- 100% Avalanche Tested

Applications

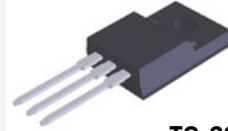
- LCD/LED/PDP TV
- Lighting
- Uninterruptible Power Supply

Description

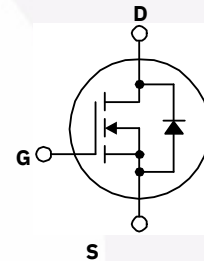
UniFET™ MOSFET is Fairchild Semiconductor's high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.



TO-220 DS



TO-220F



Absolute Maximum Ratings TC = 25°C unless otherwise noted.

Symbol	Parameter	FDP18N50	FDPF18N50 / FDPF18N50T	Unit
VDSS	Drain-Source Voltage		500	V
ID	Drain Current- Continuous (TC = 25°C) - Continuous (TC = 100°C)	18	18 *	A
		10.8	10.8 *	A
IDM	Drain Current- Pulsed (Note 1)	72	72 *	A
VGSS	Gate-Source voltage		±30	V
EAS	Single Pulsed Avalanche Energy (Note 2)		945	mJ
IAR	Avalanche Current (Note 1)		18	A
EAR	Repetitive Avalanche Energy (Note 1)		23.	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		5	V/ns
PD	Power Dissipation (TC = 25°C) - Derate Above 25°C	235	4.5	38.
		1.8		5
TJ, TSTG	Operating and Storage Temperature Range	8	-55 to +150	0.3
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	FDP18N50	FDPF18N50 / FDPF18N50T	Unit
RθJC	Thermal Resistance, Junction-to-Case, Max.	0.53		°C/W
RθJA	Thermal Resistance, Junction-to-Ambient, Max.	62.5		°C/W

Package Marking and Ordering Information

		Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity			
FDP18N50	FDP18N50T	TO-220	Tube	N/AN/A	50 units						
FDPF18N50	FDPF18N50T	TO-220F	Tube	N/AN/A	50 units						
						FDPF18N50T	FDPF18N50T	TO-220F	Tube	N/AN/A	50 units

Electrical Characteristics

	Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics							
BV _{DSS}		Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	500			V
ΔBV _{DSS} / ΔT		Breakdown Voltage Temperature Coefficient	I = 250 A, Referenced to 25°C	-0.5			V/°C
IDSS		Zero Gate Voltage Drain Current	V _{DS} = 500 V, V _{GS} = 0 V			1	μA
IG _{SSF}		Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V			100	nA
IG _{SSR}		Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V			100	nA
On Characteristics							
V _{GS(th)}		Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	3.0		5.0	V
R _{DS(on)}		Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 9 A	0.22		0.265	Ω
g _F		Forward Transconductance	V _{DS} = 40 V, I _D = 9 A			25	S
Dynamic Characteristics							
C _{iss}		Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V	2200		2860	pF
C _f		Output Capacitance	f = 1 MHz	330		430	pF
C _{rss}		Reverse Transfer Capacitance		25		40	pF
Switching Characteristics							
t _{d(on)}		Turn-On Delay Time	V _{DD} = 250 V, I _D = 18 A	55		120	ns
t _r		Turn-On Rise Time	V _{GS} = 10 V, R _G = 25 Ω	165		340	ns
t _{d(off)}		Turn-Off Delay Time		95		200	ns
t _f		Turn-Off Fall Time (Note 4)		90		190	ns
Q _g		Total Gate Charge	V _{DS} = 400 V, I _D = 18 A			456	nC
Q _{gs}		Gate-Source Charge	V _{GS} = 10 V			12.5	nC
Q _{gd}		Gate-Drain Charge (Note 4)				19	nC
Drain-Source Diode Characteristics and Maximum Ratings							
I _S		Maximum Continuous Drain-Source Diode Forward Current				18	A
I _{SM}		Maximum Pulsed Drain-Source Diode Forward Current				72	A
V _{SD}		Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 18 A			1.4	V
t _{rr}		Reverse Recovery Time	V _{GS} = 0 V, I _S = 18 A			500	ns
Q _{rr}		Reverse Recovery Charge	dI _F /dt = 100 A/μs			5.4	μC

Notes:

1. Repetitive rating; pulse-width limited by maximum junction temperature.
2. L = 5.2 mH, I_{AS} = 18 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 18 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

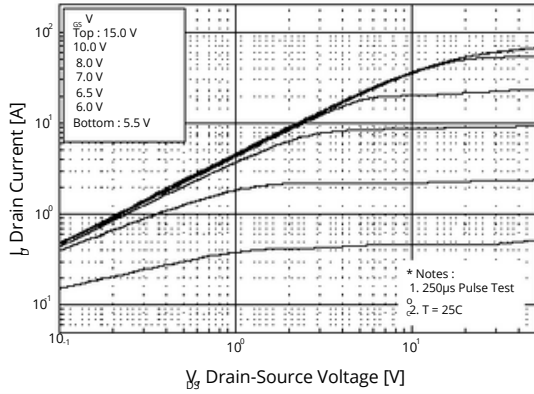


Figure 2. Transfer Characteristics

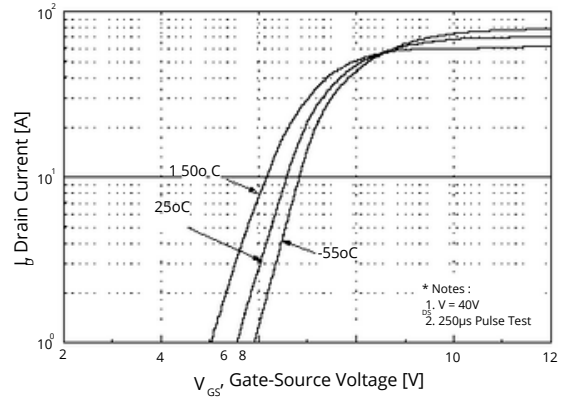


Figure 3. On-Resistance Variation vs. Drain Current and Temperature **Figure 4. Body Diode Forward Voltage and Gate Voltage Variation vs. Source Current**

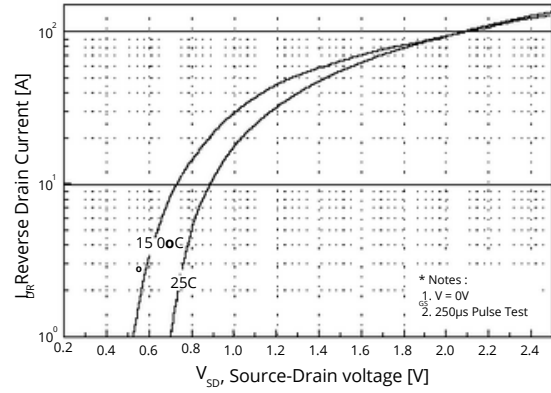
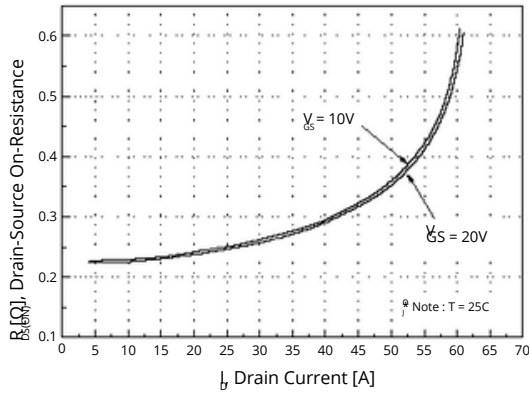


Figure 5. Capacitance Characteristics

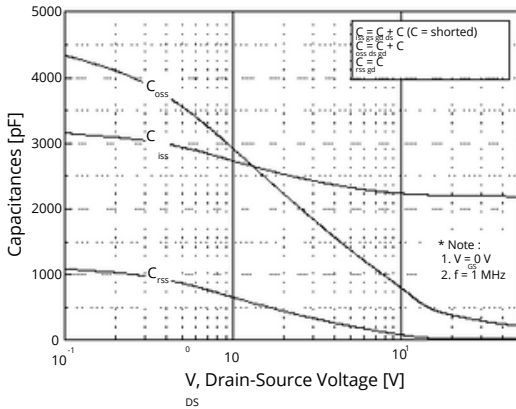
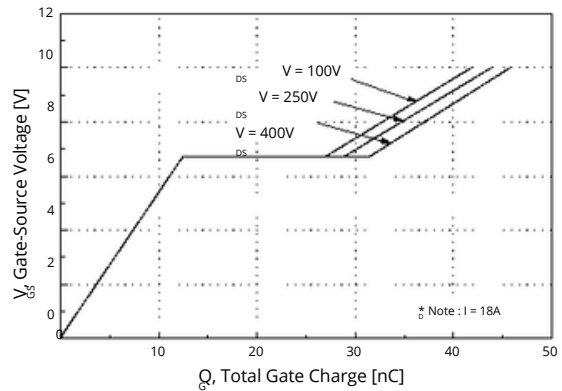


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature Figure 8. On-Resistance Variation vs. Temperature

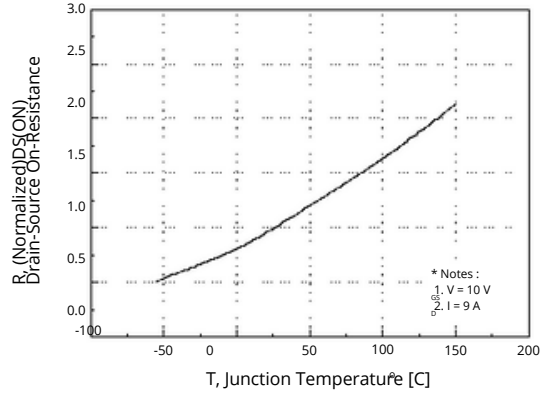
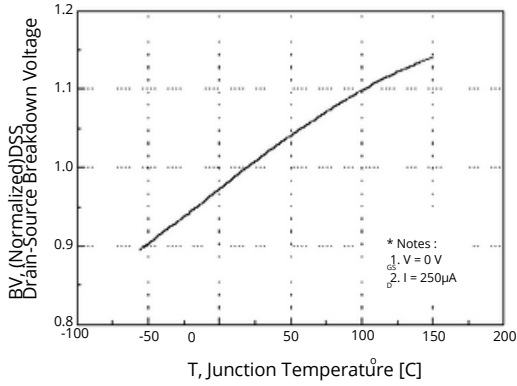


Figure 9-1. Maximum Safe Operating Area - FDP18N50 Figure 9-2. Maximum Safe Operating Area - FDPF18N50 / FDPF18N50T

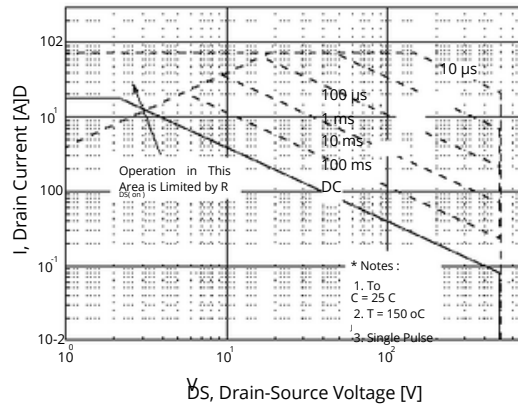
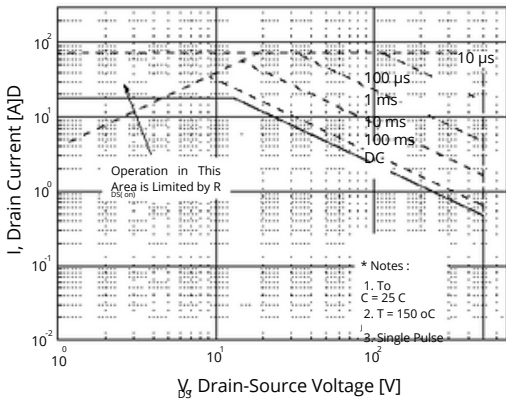
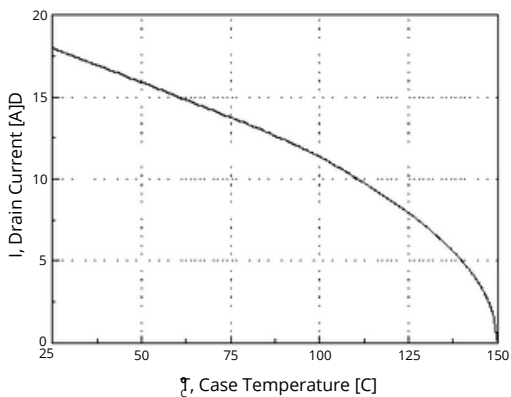


Figure 10. Maximum Drain Current vs. Case Temperature



Typical Performance Characteristics (Continued)

Figure 11-1. Transient Thermal Response Curve - FDP18N50

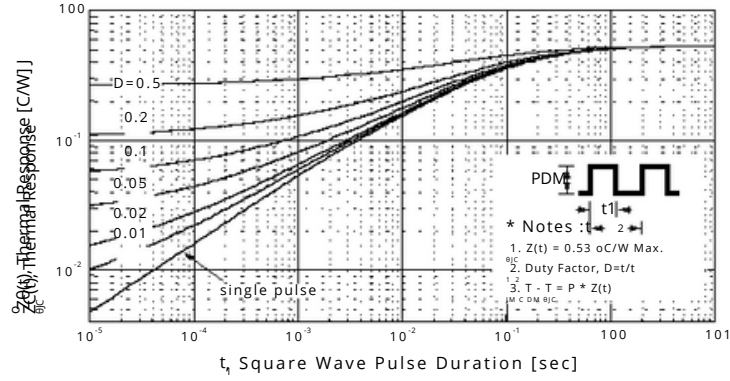
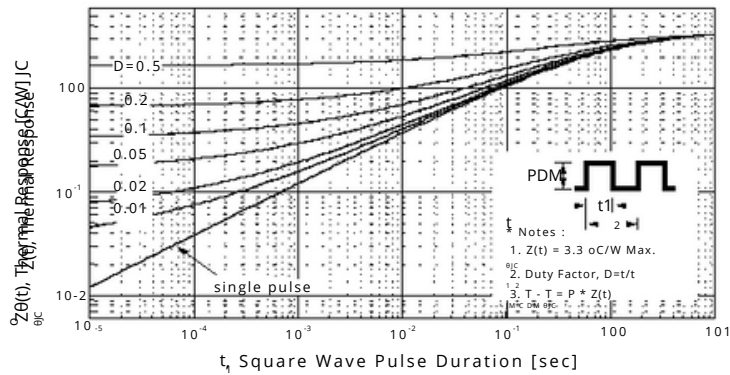


Figure 11-2. Transient Thermal Response Curve - FDPF18N50 / FDPF18N50T



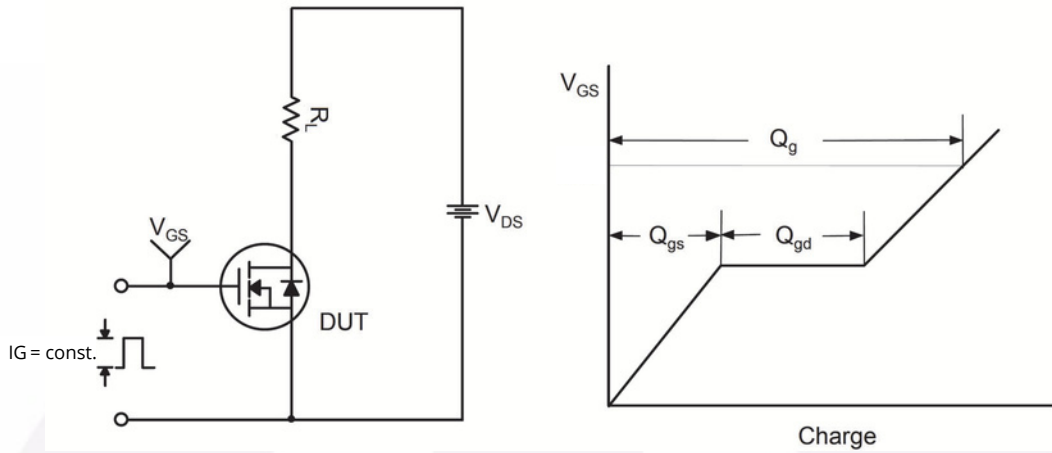


Figure 12. Gate Charge Test Circuit & Waveform

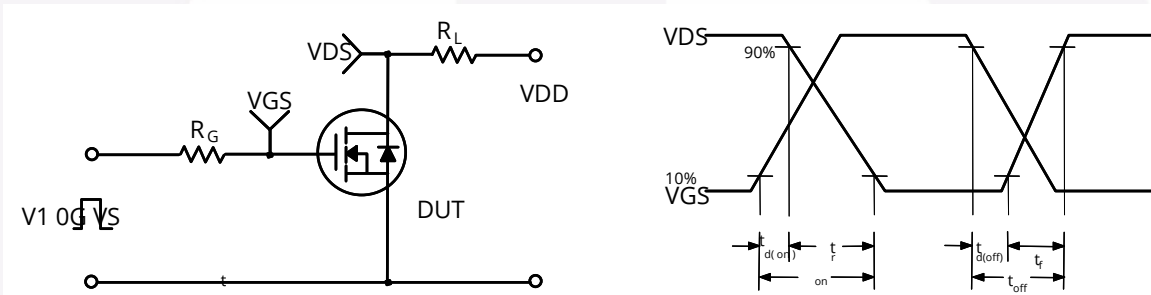


Figure 13. Resistive Switching Test Circuit & Waveforms

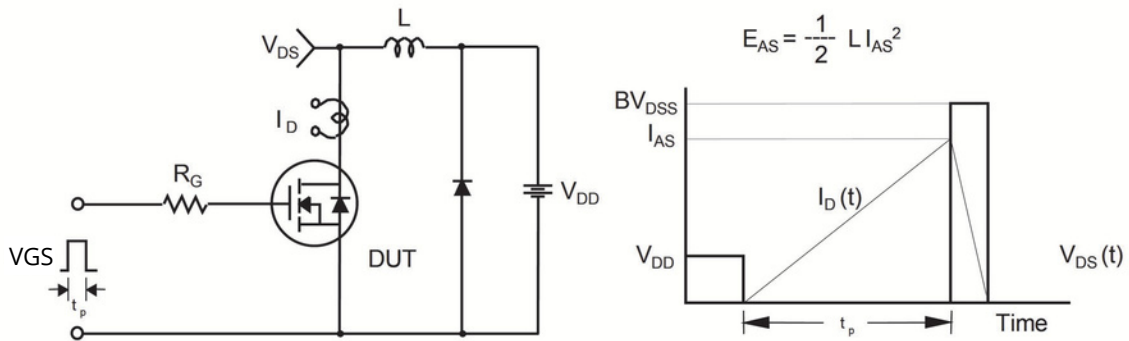


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

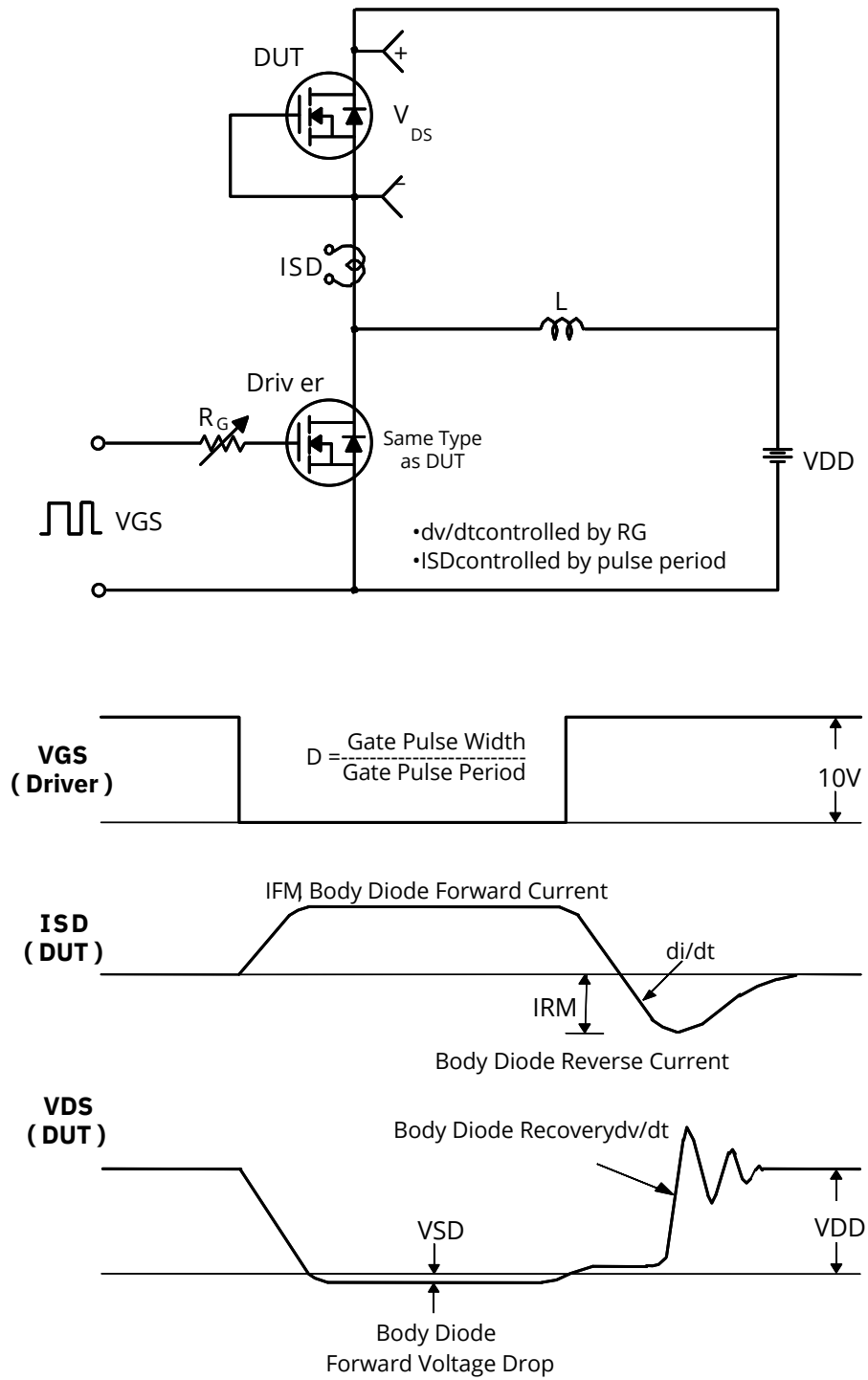


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

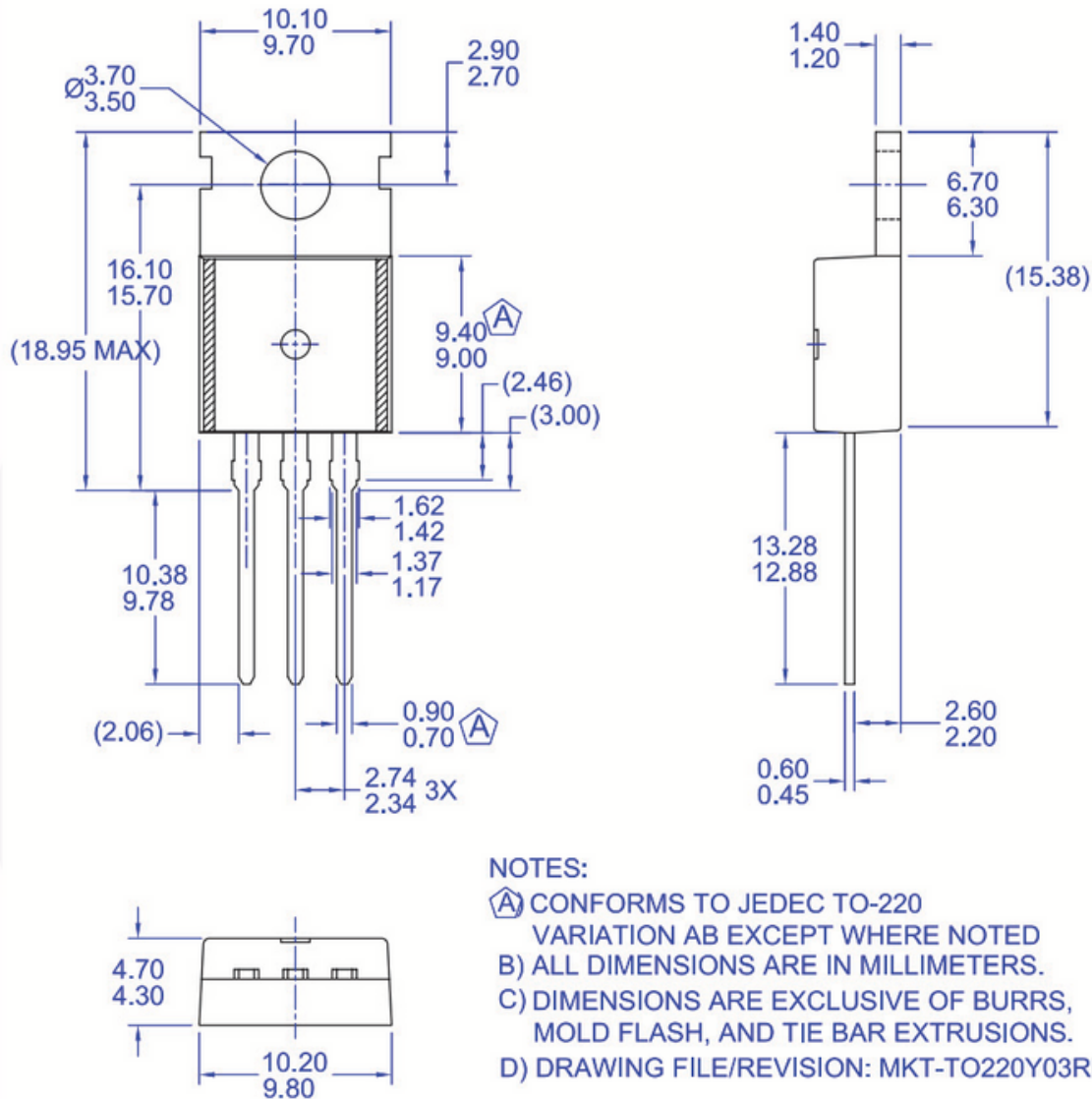


Figure 16. TO220, Molded, 3-Lead, Jedec Variation AB

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Mechanical Dimensions

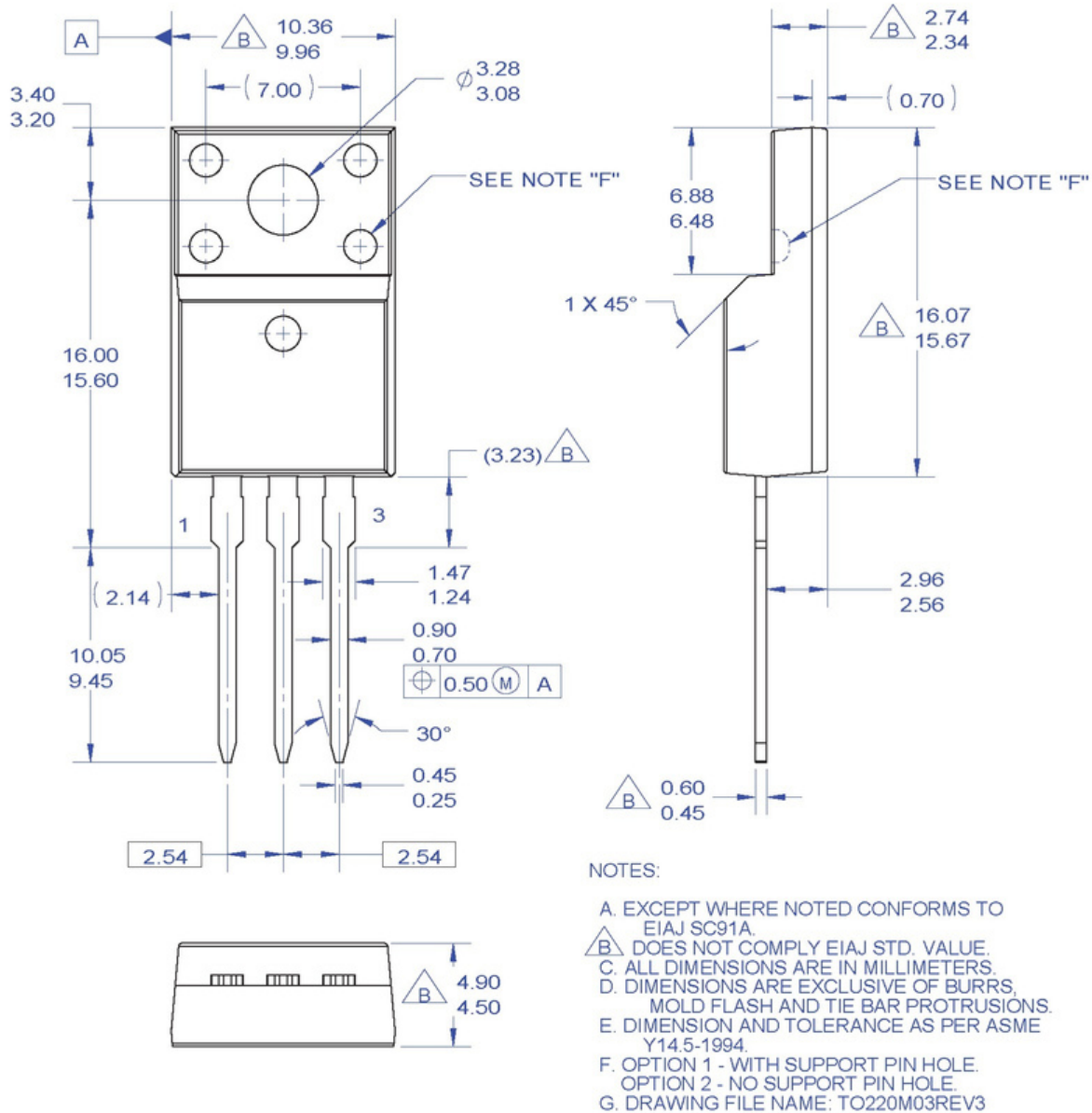


Figure 17. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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