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FDP55N06 / FDPF55N06

N-Channel UniFET™ MOSFET

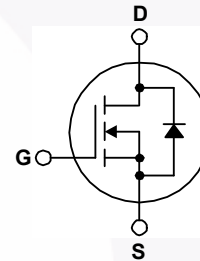
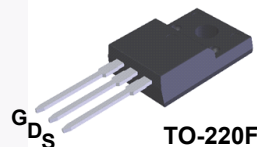
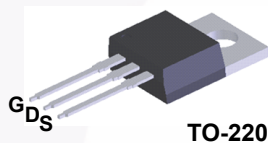
60 V, 55 A, 22 mΩ

Features

- $R_{DS(on)} = 22 \text{ m}\Omega$ @ $V_{GS} = 10 \text{ V}$, $I_D = 27.5 \text{ A}$
- Low Gate Charge (Typ. 30 nC)
- Low Crss (Typ. 60 pF)
- 100% Avalanche Tested

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.



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	FDP55N06	FDPF55N06	Unit
V_{DSS}	Drain-Source Voltage	60		V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	55	55 *	A
	- Continuous ($T_C = 100^\circ\text{C}$)	34.8	34.8 *	A
I_{DM}	Drain Current - Pulsed (Note 1)	220	220 *	A
V_{GSS}	Gate-Source Voltage	± 25		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	480		mJ
I_{AR}	Avalanche Current (Note 1)	55		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	11.4		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	114	48	W
	- Derate above 25°C	0.9	0.4	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		$^\circ\text{C}$

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	FDP55N06	FDPF55N06	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	1.1	2.58	$^\circ\text{C}/\text{W}$
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink, Typ.	0.5	--	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	62.5	$^\circ\text{C}/\text{W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP55N06	FDP55N06	TO-220	Tube	N/A	50 units
FDPF55N06	FDPF55N06	TO-220F	Tube	N/A	50 units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units	
Off Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	60	--	--	V	
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C	--	0.05	--	V/°C	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60 V, V _{GS} = 0 V	--	--	1	μA	
		V _{DS} = 48 V, T _C = 150°C	--	--	10	μA	
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 20 V, V _{DS} = 0 V	--	--	100	nA	
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -20 V, V _{DS} = 0 V	--	--	-100	nA	
On Characteristics							
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	2.0	--	4.0	V	
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 27.5 A	--	0.018	0.022	Ω	
g _{FS}	Forward Transconductance	V _{DS} = 25 V, I _D = 27.5 A	--	33	--	S	
Dynamic Characteristics							
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	1160	1510	pF	
C _{oss}	Output Capacitance		--	375	490	pF	
C _{rss}	Reverse Transfer Capacitance		--	60	90	pF	
Switching Characteristics							
t _{d(on)}	Turn-On Delay Time	V _{DD} = 30 V, I _D = 55 A, R _G = 25 Ω	--	30	65	ns	
t _r	Turn-On Rise Time		--	130	265	ns	
t _{d(off)}	Turn-Off Delay Time		(Note 4)	--	70	150	ns
t _f	Turn-Off Fall Time		(Note 4)	--	95	195	ns
Q _g	Total Gate Charge	V _{DS} = 48 V, I _D = 55A, V _{GS} = 10 V	--	30	37	nC	
Q _{gs}	Gate-Source Charge		(Note 4)	--	6.5	--	nC
Q _{gd}	Gate-Drain Charge		(Note 4)	--	7.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings							
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	55	A	
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	220	A	
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 55 A	--	--	1.4	V	
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 55 A, dI _F / dt = 100 A/μs	--	40	--	ns	
Q _{rr}	Reverse Recovery Charge		--	55	--	μC	

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 5.6mH, I_{AS} = 55A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 55A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. On-Region Characteristics

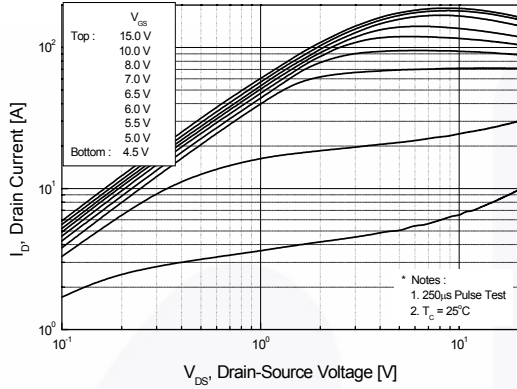


Figure 2. Transfer Characteristics

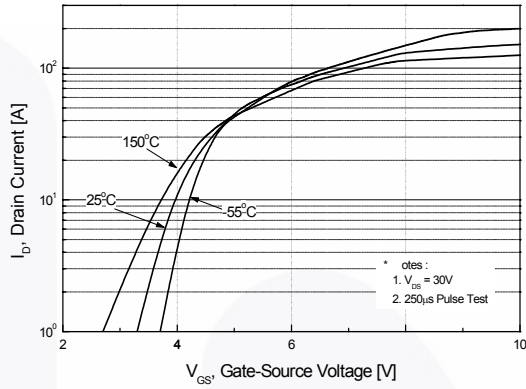


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

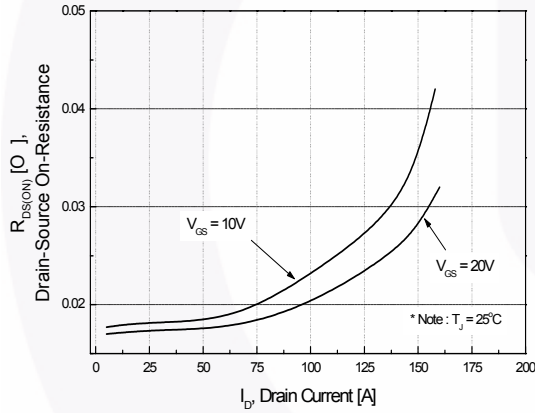


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

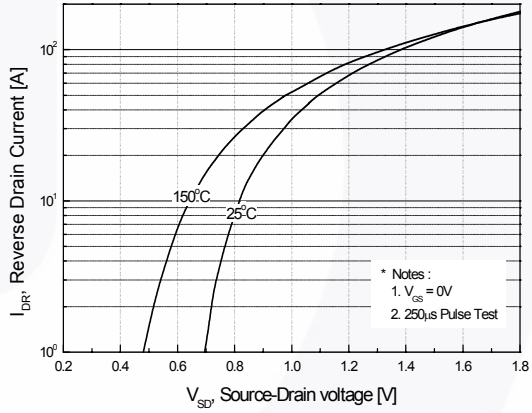


Figure 5. Capacitance Characteristics

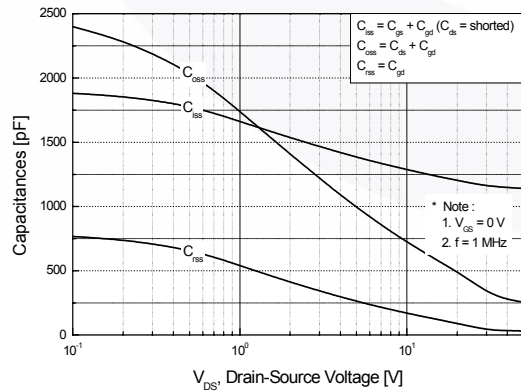
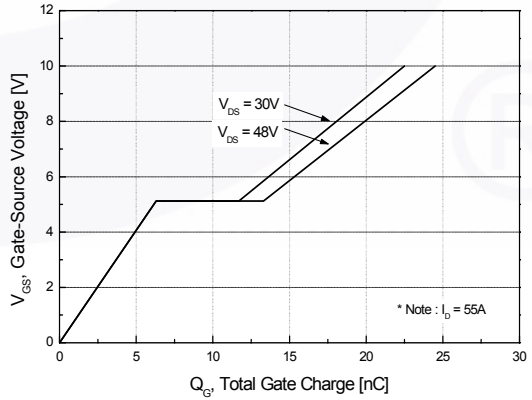


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

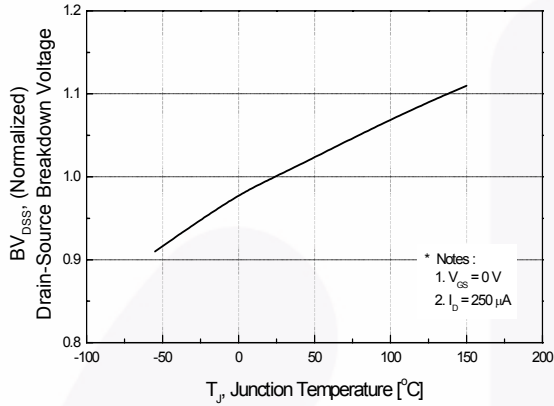


Figure 8. On-Resistance Variation vs. Temperature

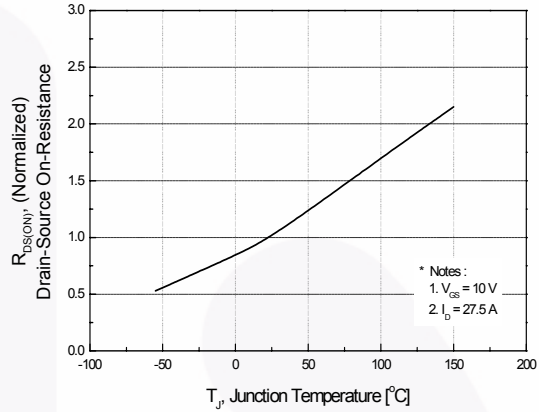


Figure 9-1. Maximum Safe Operating Area for FDP55N06

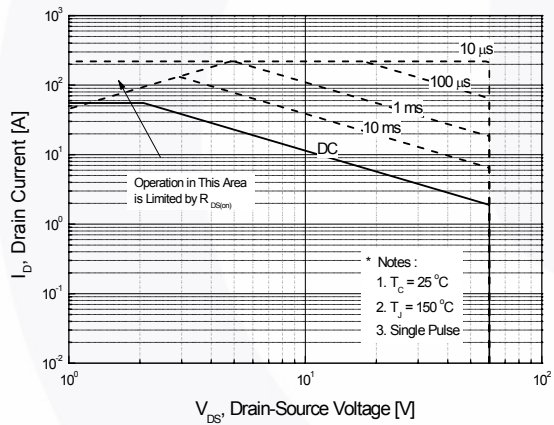


Figure 9-2. Maximum Safe Operating Area for FDPF55N06

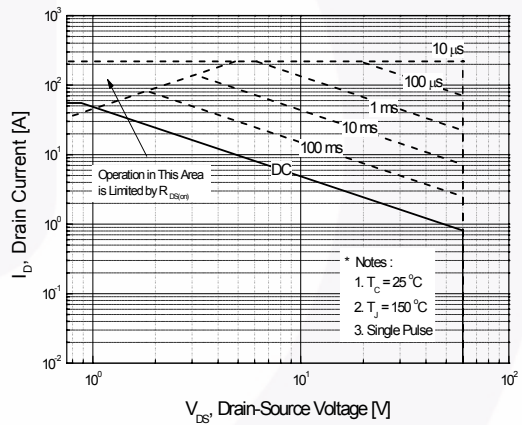
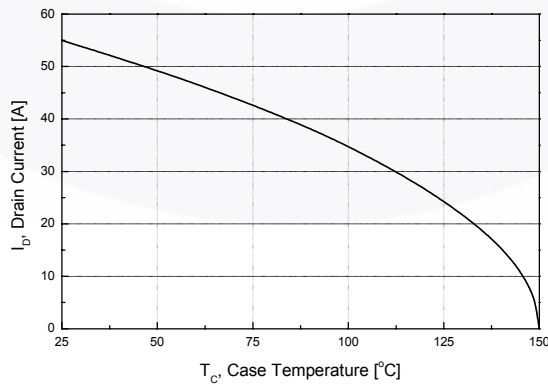


Figure 10. Maximum Drain Current vs. Case Temperature



Typical Performance Characteristics (Continued)

Figure 11-1. Transient Thermal Response Curve for FDP55N06

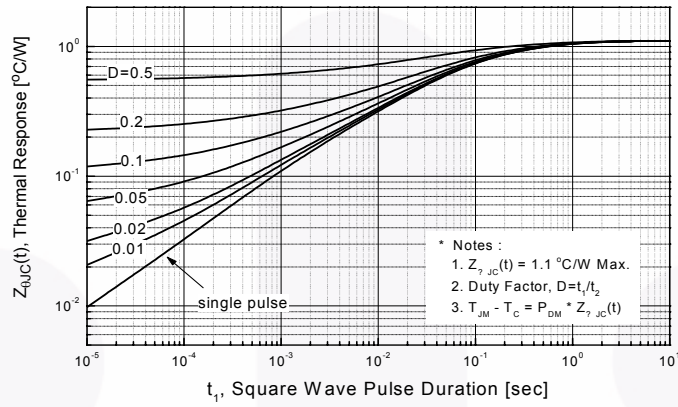


Figure 11-2. Transient Thermal Response Curve for FDPF55N06

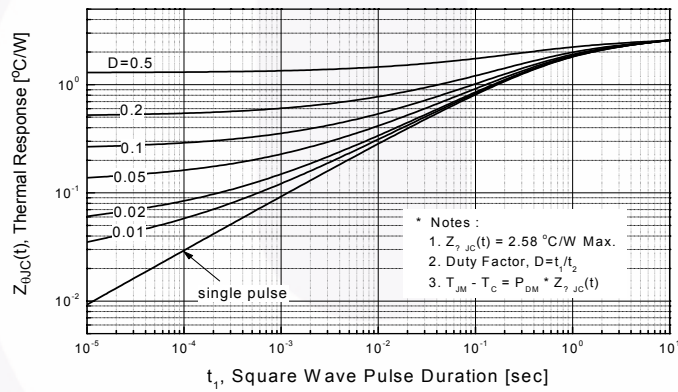


Figure 12. Gate Charge Test Circuit & Waveform

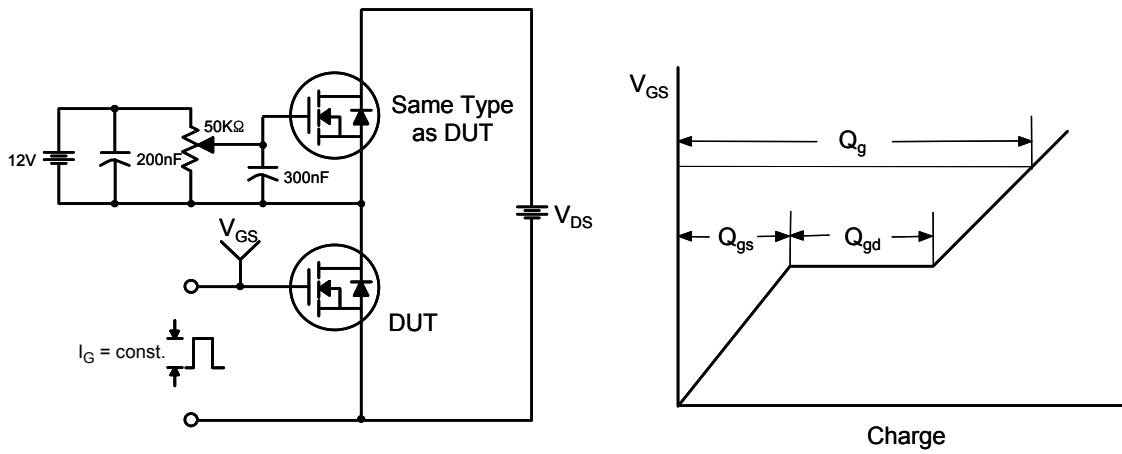


Figure 13. Resistive Switching Test Circuit & Waveforms

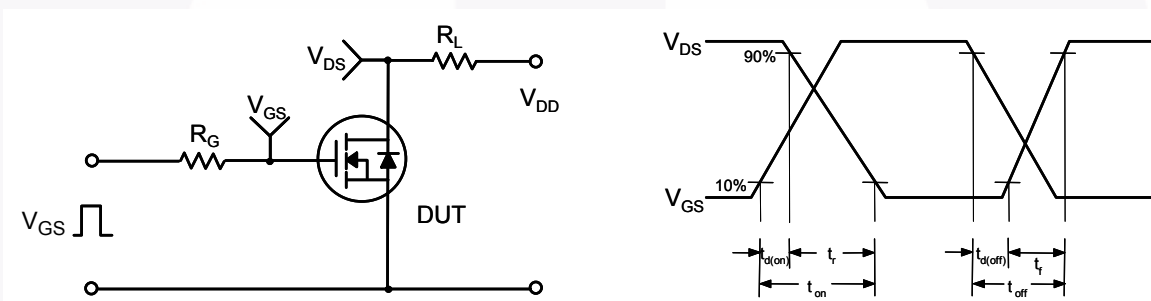
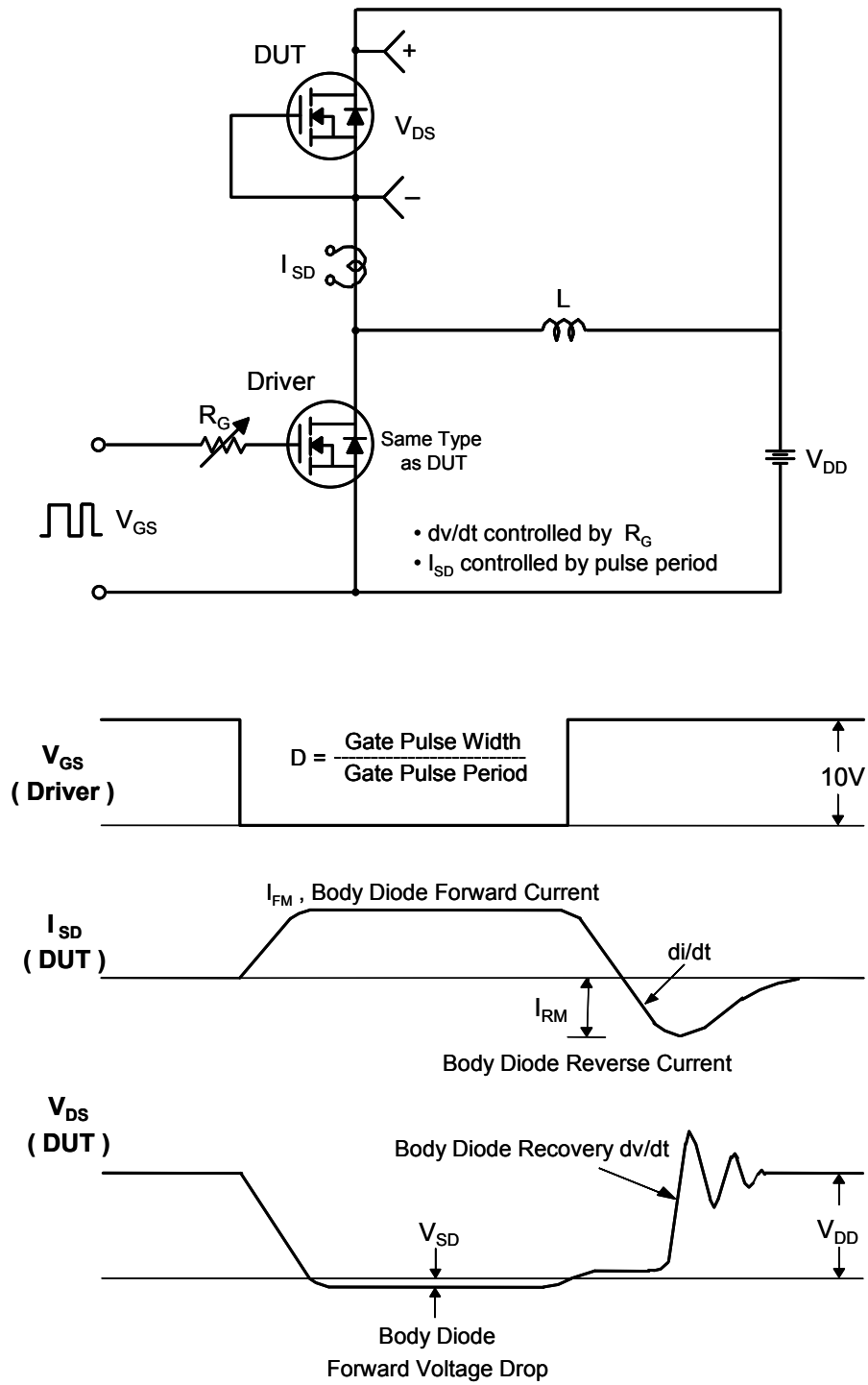


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



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



Mechanical Dimensions

TO-220 3L

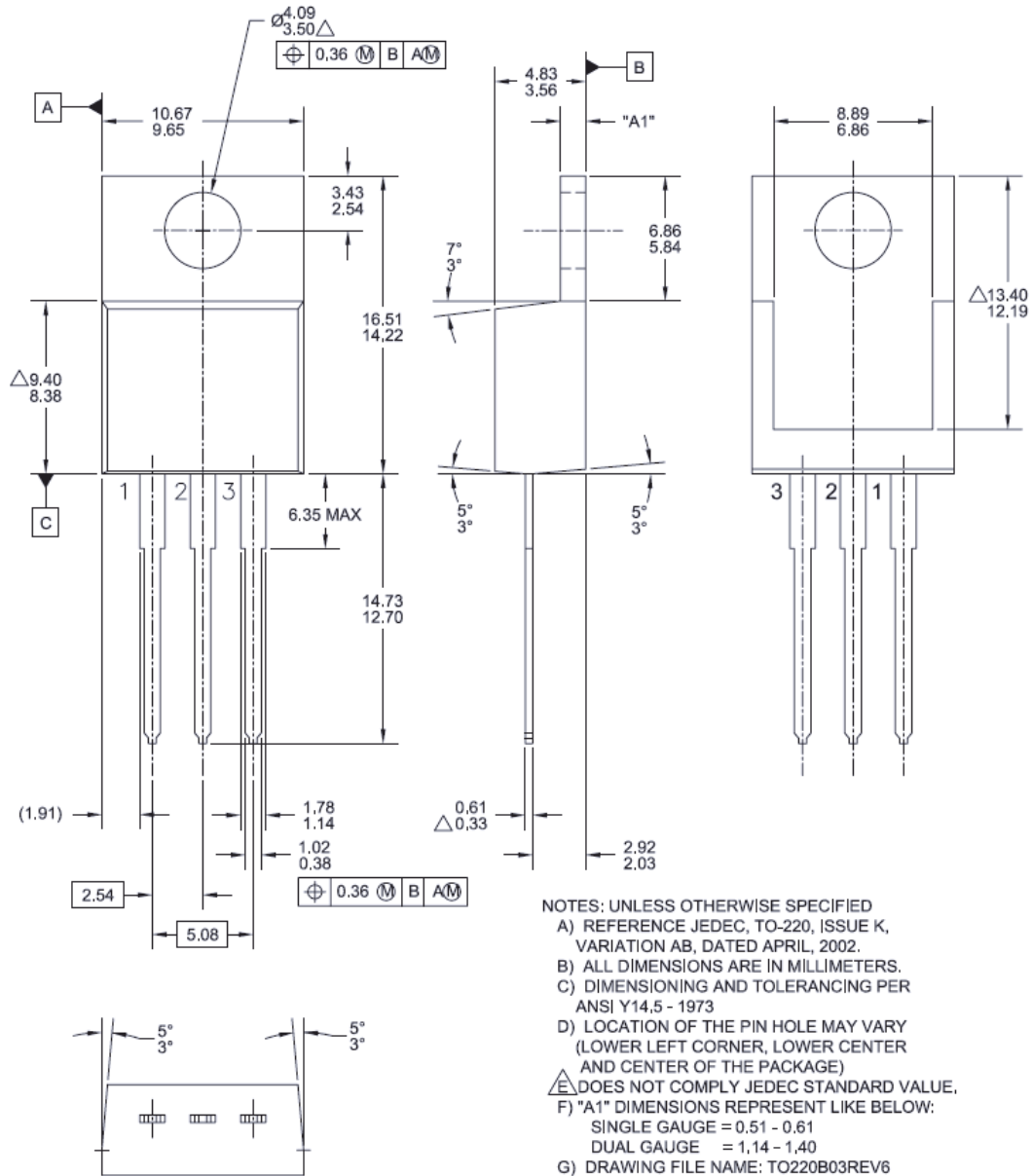


Figure 16. TO-220, Molded, 3Lead, Jedec Variation AB

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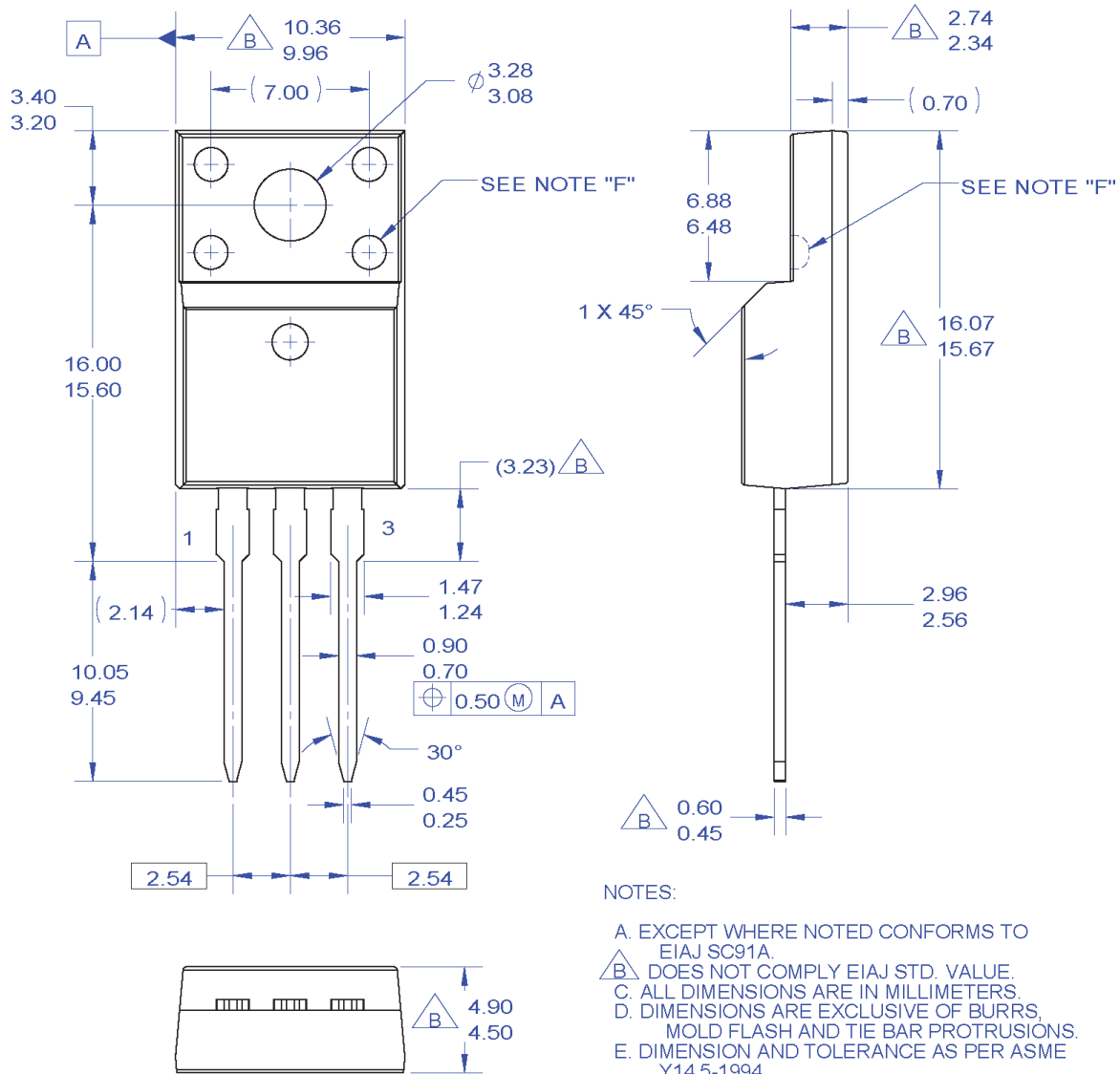
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Dimension in Millimeters

Mechanical Dimensions

TO-220F 3L



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

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

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Dimension in Millimeters



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