December 2013

FDP75N08A

N-Channel UniFET^{TM} MOSFET

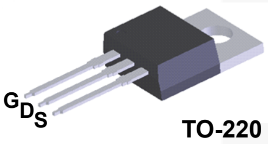
75 V, 75 A, 11 mΩ

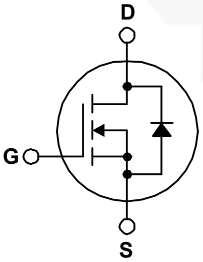
Features

- 75 A, 75 V, $R_{DS(on)}$ = 11 mΩ @ V_{GS} = 10 V
- Low Gate Charge (Typ. 145 nC)
- Low Crss (Typ. 86 pF)
- Fast Switching
- Improved dv/dt Capability

Description

UniFET^{TM} 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°C unless otherwise noted.

Symbol	Parameter	FDP75N08A	Unit
V_{DSS}	Drain-Source Voltage	75	V
I_D	Drain Current - Continuous (T_C = 25°C)	75	A
	- Continuous (T_C = 100°C)	47	A
I_{DM}	Drain Current - Pulsed (Note 1)	300	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	1738	mJ
I_{AR}	Avalanche Current (Note 1)	75	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	13.7	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation (T_C = 25°C)	137	W
	- Derate Above 25°C	1.09	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds	300	°C

Thermal Characteristics

Symbol	Parameter	FDP75N08A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.91	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP75N08A	FDP75N08A	TO-220	Tube	N/A	50 units

Electrical Characteristics

TC = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	75	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.6	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 75 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 60 V, T_C = 125°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 = 37.5 A	--	9.4	11	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 37.5 A	--	15	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	3437	4468	pF
C_{oss}	Output Capacitance		--	738	959	pF
C_{rss}	Reverse Transfer Capacitance		--	86	129	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 37.5 V, I_D = 75A, R_G = 25 Ω (Note 4)	--	43	95	ns
t_r	Turn-On Rise Time		--	212	434	ns
$t_{d(off)}$	Turn-Off Delay Time		--	273	556	ns
t_f	Turn-Off Fall Time		--	147	303	ns
Q_g	Total Gate Charge	V_{DS} = 60 V, I_D = 75A, V_{GS} = 10 V (Note 4)	--	80	104	nC
Q_{gs}	Gate-Source Charge		--	20	--	nC
Q_{gd}	Gate-Drain Charge		--	24	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	75	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	300	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 75 A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 75 A, dI_F / dt = 100 A/μs	--	62	--	ns
Q_{rr}	Reverse Recovery Charge		--	145	--	nC

Notes:

1: Repetitive rating: pulse-width limited by maximum junction temperature.

2: L = 206 μH, I_{AS} = 75 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.

3: I_{SD} ≤ 75A, di/dt ≤ 200A/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

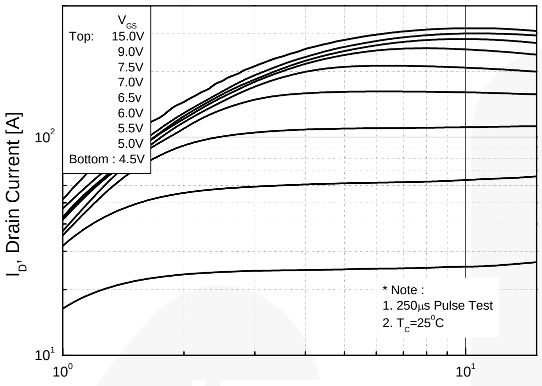


Figure 2. Transfer Characteristics

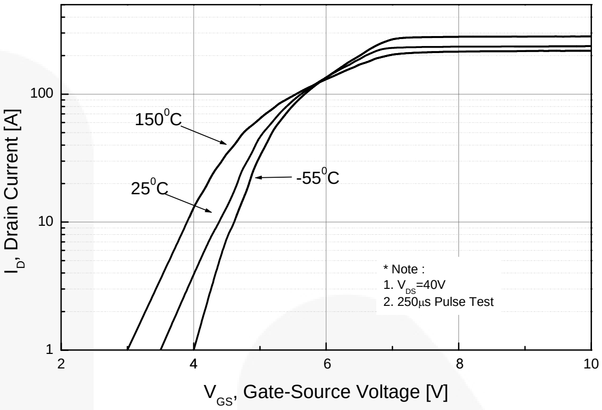


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

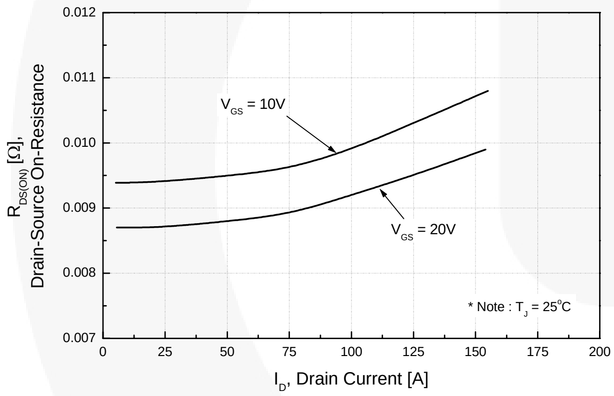


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

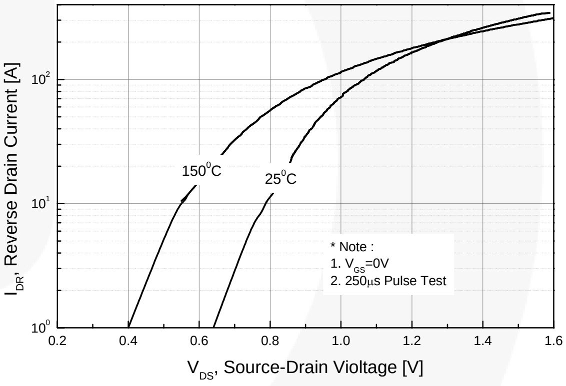


Figure 5. Capacitance Characteristics

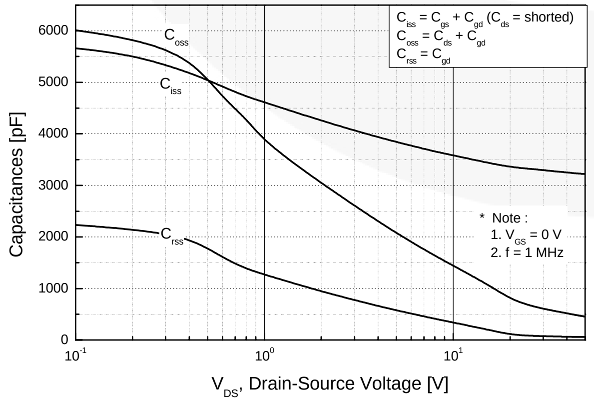
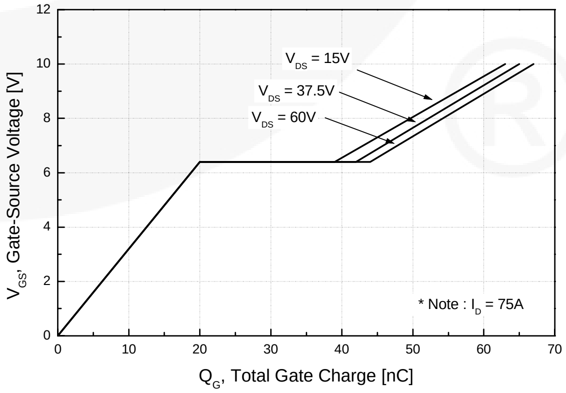
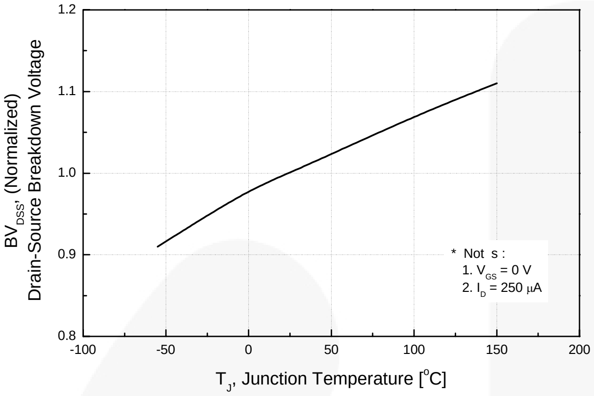


Figure 6. Gate Charge Characteristics



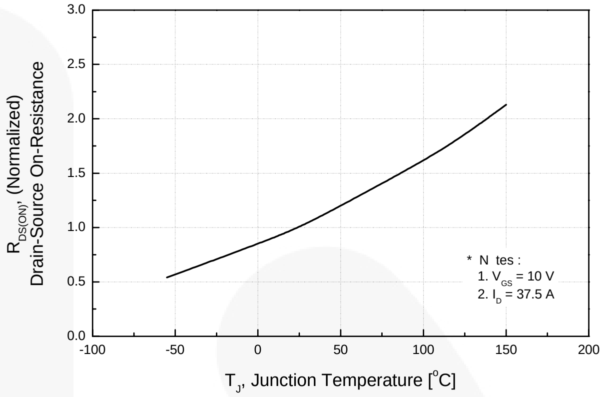
Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature



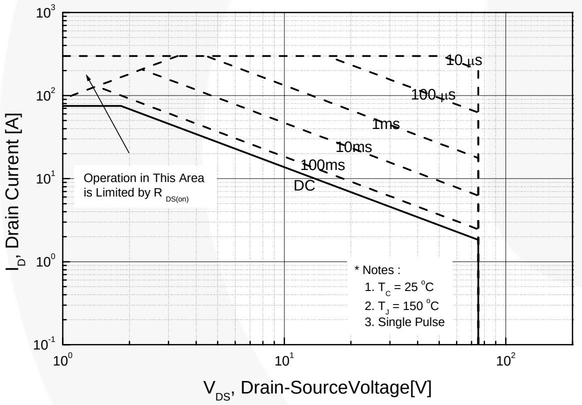
* Notes :
1. V_{GS} = 0 V
2. I_D = 250 μA

Figure 8. On-Resistance Variation vs. Temperature



* Notes :
1. V_{GS} = 10 V
2. I_D = 37.5 A

Figure 9. Maximum Safe Operating Area



* Notes :
1. T_C = 25 °C
2. T_J = 150 °C
3. Single Pulse

Figure 10. Maximum Drain Current vs. Case Temperature

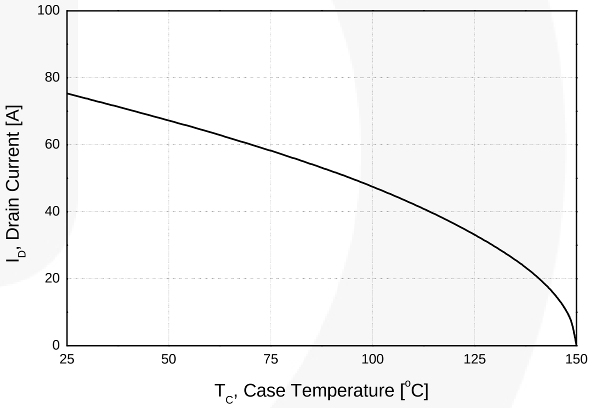
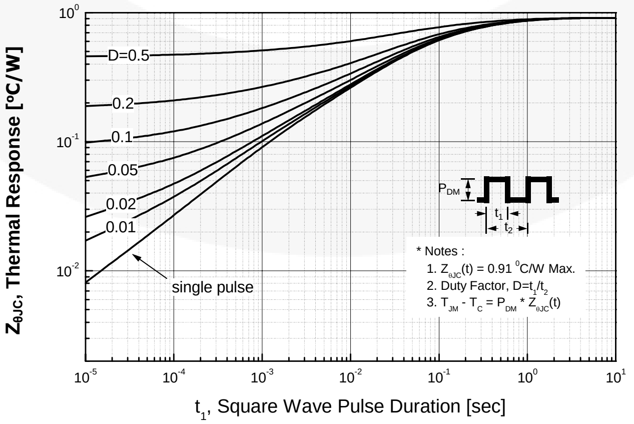


Figure 11. Transient Thermal Response Curve



* Notes :
1. $Z_{\theta JC}(t)$ = 0.91 °C/W Max.
2. Duty Factor, $D=t_1/t_2$
3. $T_{JM} - T_C = P_{DM} * Z_{\theta JC}(t)$

Figure 12. Gate Charge Test Circuit & Waveform

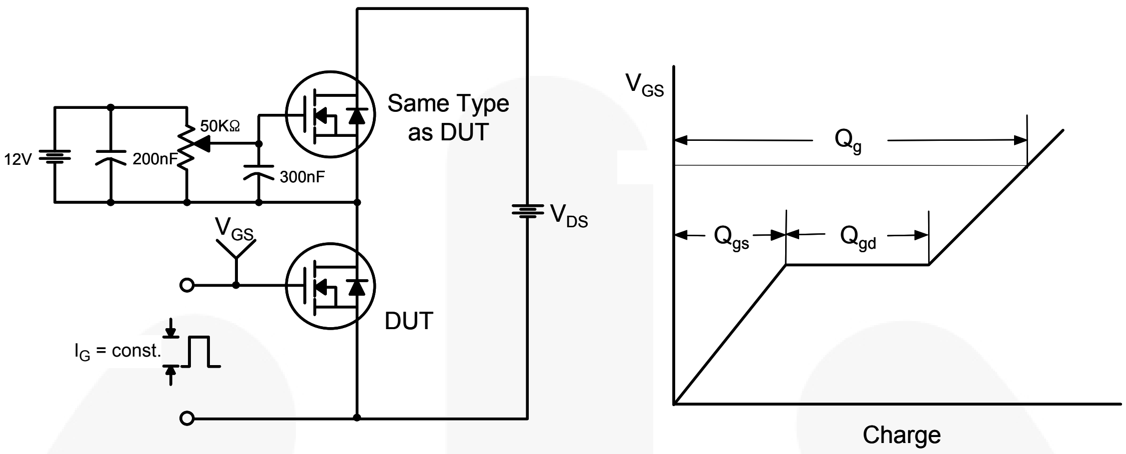


Figure 13. Resistive Switching Test Circuit & Waveforms

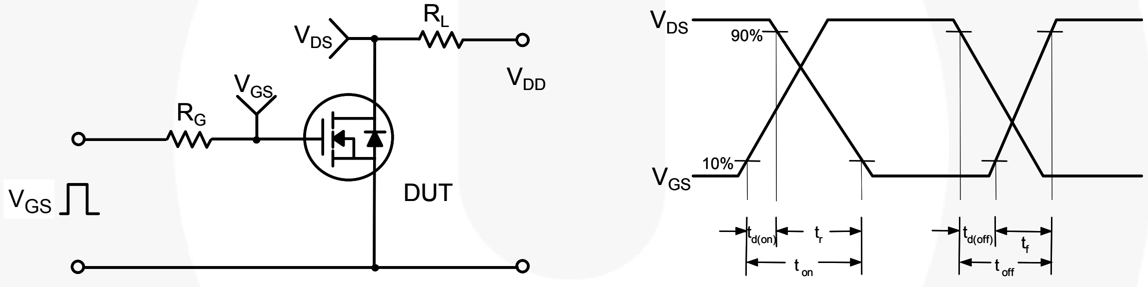


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

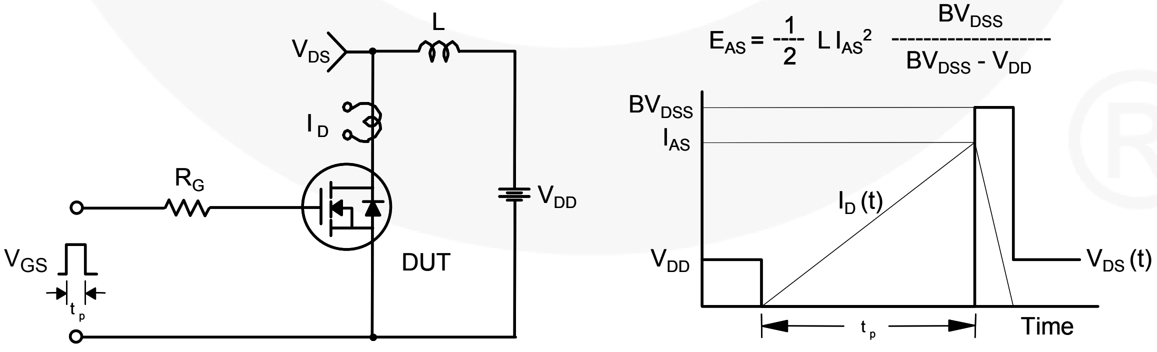
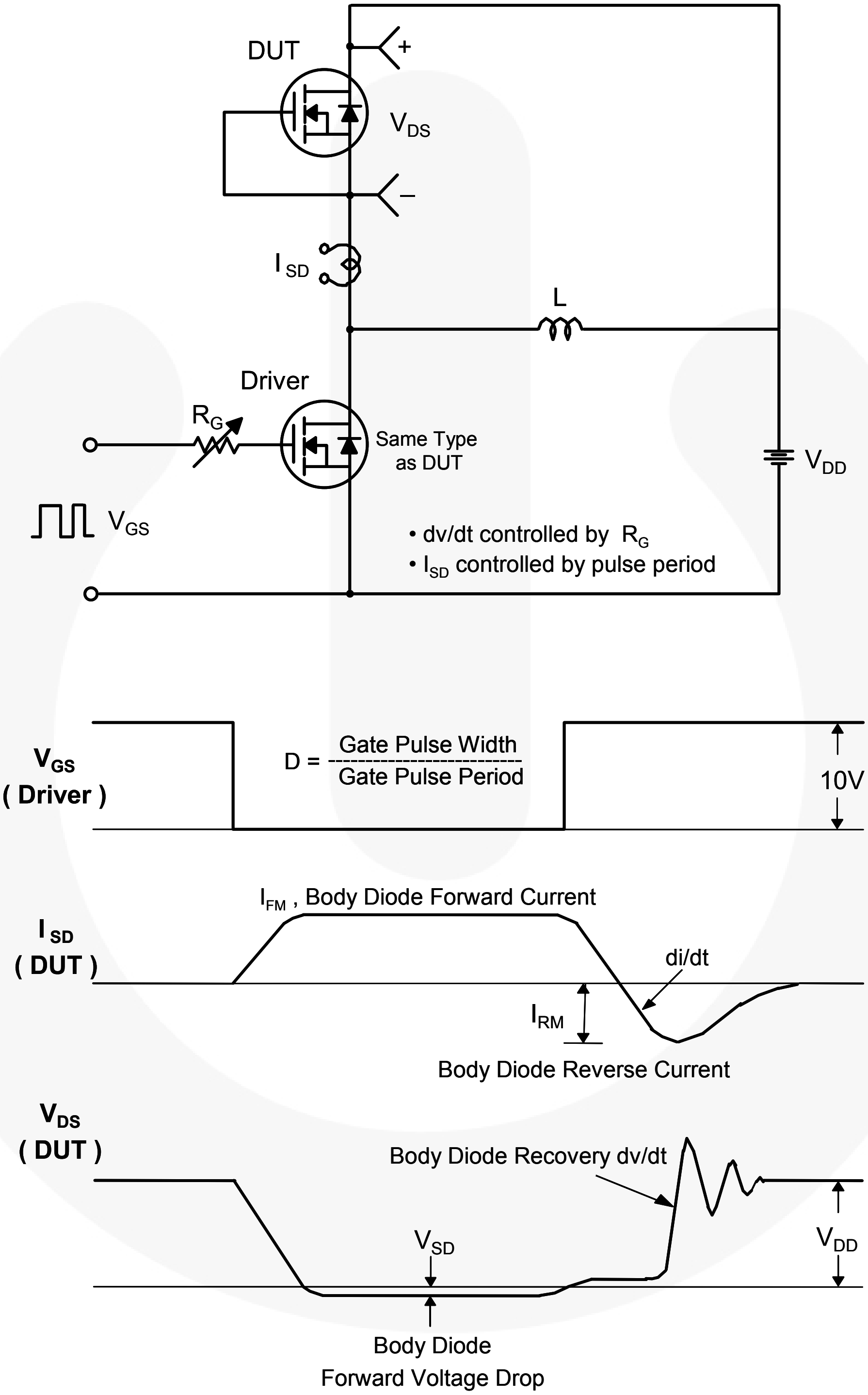
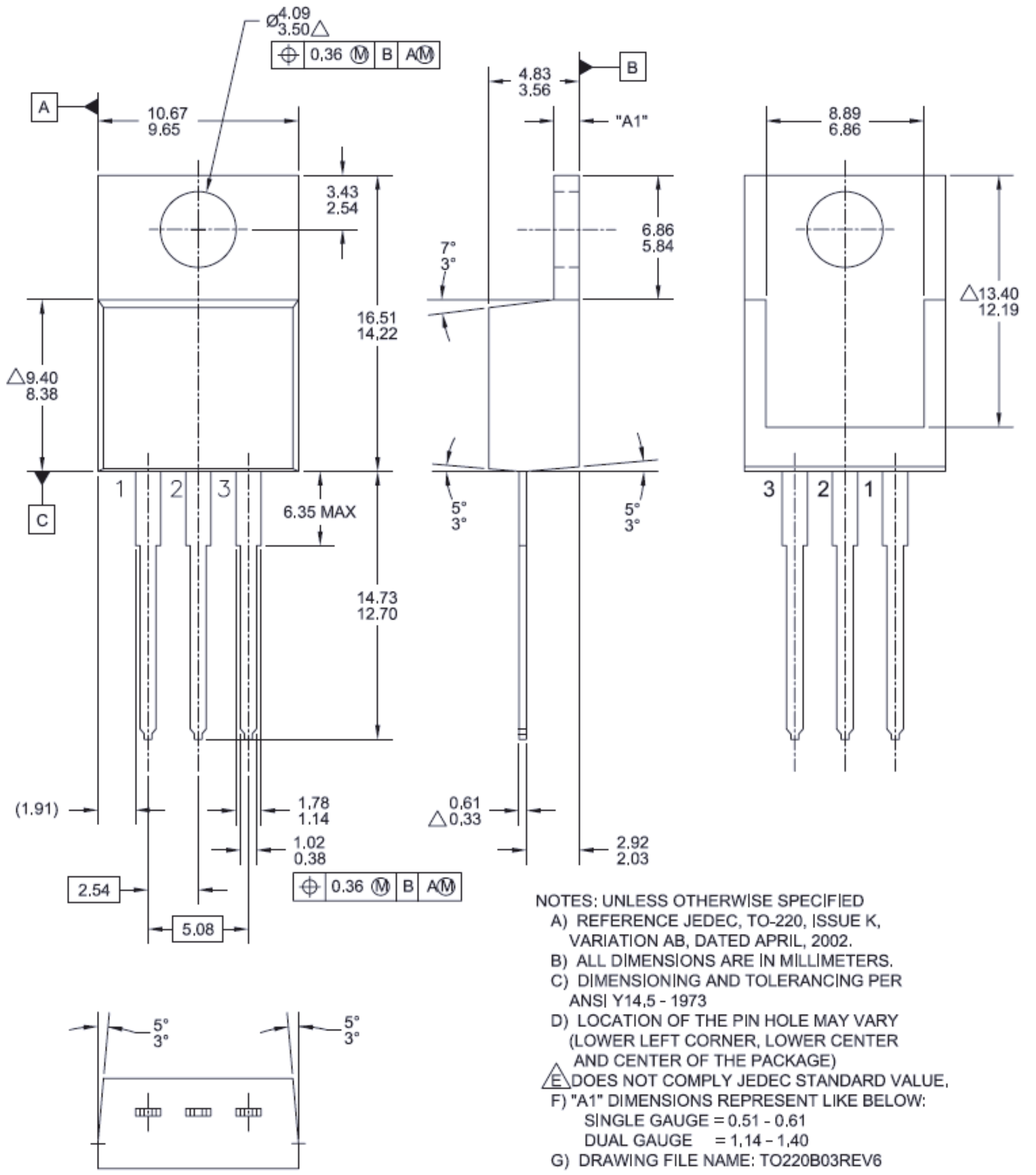


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions



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
DUAL GAUGE = 1.14 - 1.40

G) DRAWING FILE NAME: TO220B03REV6

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

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