

FDP075N15A_F102 / FDB075N15A

N-Channel PowerTrench® MOSFET

150V, 130A, 7.5mΩ

Features

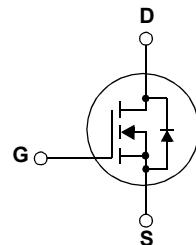
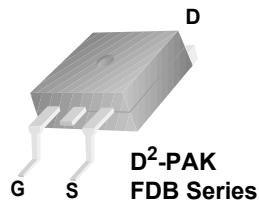
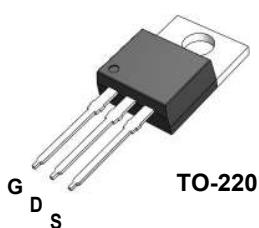
- $R_{DS(on)} = 6.25\text{m}\Omega$ (Typ.) @ $V_{GS} = 10\text{V}$, $I_D = 100\text{A}$
- Fast Switching
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Application

- DC to DC Converters
- Synchronous Rectification for Telecommunication PSU
- Battery Charger
- AC motor drives and Uninterruptible Power Supplies
- Off-line UPS



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

Symbol	Parameter	FDP075N15A_F102 FDB075N15A	Units
V_{DSS}	Drain to Source Voltage	150	V
V_{GSS}	Gate to Source Voltage	± 20	V
I_D	Drain Current	130	A
		92	
I_{DM}	Drain Current	(Note 1)	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	V/ns
P_D	Power Dissipation	333	W
		2.22	$W/^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

*Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	FDP075N15A_F102 FDB075N15A	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.45	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

Package Marking and Ordering Information

Device Marking	Device	Package	Description	Quantity
FDP075N15A	FDP075N15A_F102	TO-220	F102: Trimmed Leads	50

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB075N15A	FDB075N15A	D2-PAK	330mm	24mm	800

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	150	-	-	V
$\Delta \text{BV}_{\text{DSS}}$ ΔT_J	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, Referenced to 25°C	-	0.1	-	$^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
		$V_{DS} = 120\text{V}, T_C = 150^\circ\text{C}$	-	-	500	
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	± 100	μA

On Characteristics

$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2.0	-	4.0	V
$R_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 100\text{A}$	-	6.25	7.5	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 100\text{A}$ (Note 4)	-	164	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	5525	7350	pF
C_{oss}	Output Capacitance		-	516	685	pF
C_{rss}	Reverse Transfer Capacitance		-	21	-	pF
$C_{\text{oss(er)}}$	Energy Related Output Capacitance	$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}$	-	909	-	pF
$Q_{\text{g(tot)}}$	Total Gate Charge at 10V		-	77	100	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DS} = 75\text{V}, I_D = 100\text{A}$ $V_{GS} = 10\text{V}$	-	26	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	11	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	16	-	nC
ESR	Equivalent Series Resistance(G-S)	Drain Open, $f = 1\text{MHz}$	-	2.29	-	Ω

Switching Characteristics

$t_{\text{d(on)}}$	Turn-On Delay Time	$V_{DD} = 75\text{V}, I_D = 100\text{A}$ $V_{GS} = 10\text{V}, R_{\text{GEN}} = 4.7\Omega$	-	28	66	ns
t_r	Turn-On Rise Time		-	37	84	ns
$t_{\text{d(off)}}$	Turn-Off Delay Time		-	62	134	ns
t_f	Turn-Off Fall Time		-	21	52	ns

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain to Source Diode Forward Current	-	-	130	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current	-	-	520	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_{SD} = 100\text{A}$	-	-	1.25
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{V}, V_{DD} = 75\text{V}, I_{SD} = 100\text{A}$	-	97	-
Q_{rr}	Reverse Recovery Charge	$dI_F/dt = 100\text{A}/\mu\text{s}$	-	264	-

Notes:

- Repetitive Rating: Pulse width limited by maximum junction temperature
- Starting $T_J = 25^\circ\text{C}$, $L = 3\text{ mH}$, $I_{AS} = 19.8\text{ A}$
- $I_{SD} \leq 100\text{ A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
- Pulse Test: Pulse width $\leq 300\mu\text{s}$, Dual Cycle $\leq 2\%$
- Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

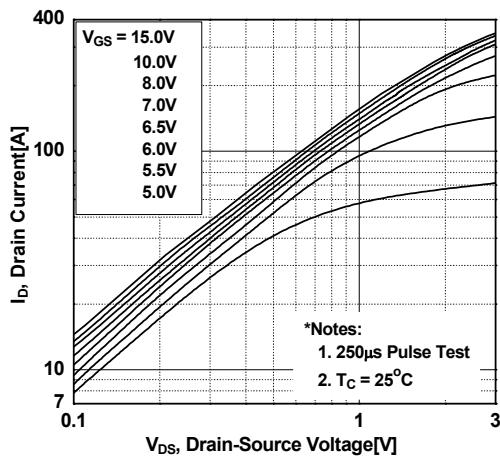


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

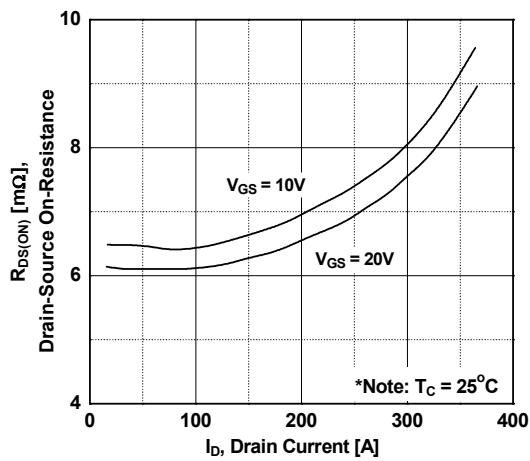


Figure 5. Capacitance Characteristics

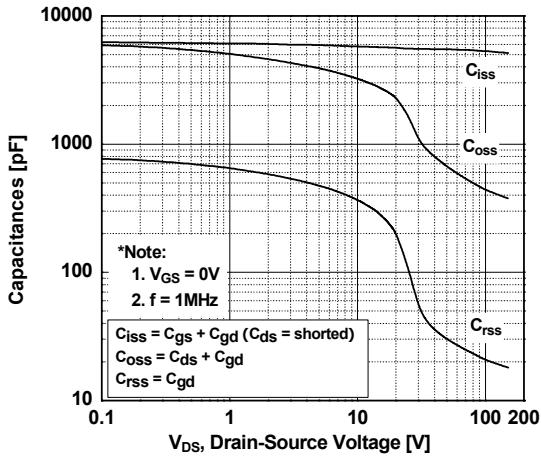


Figure 2. Transfer Characteristics

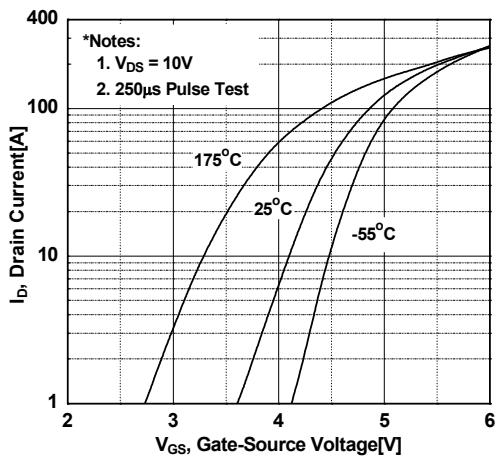


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

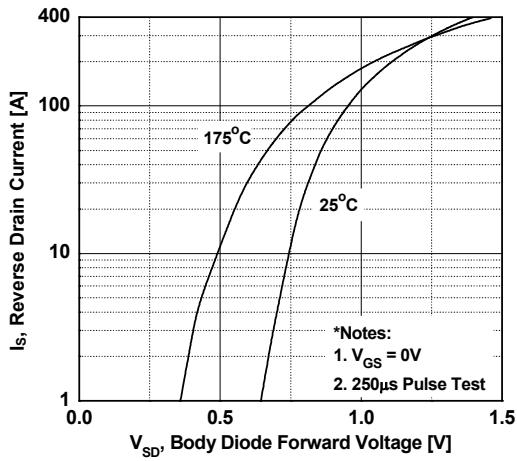
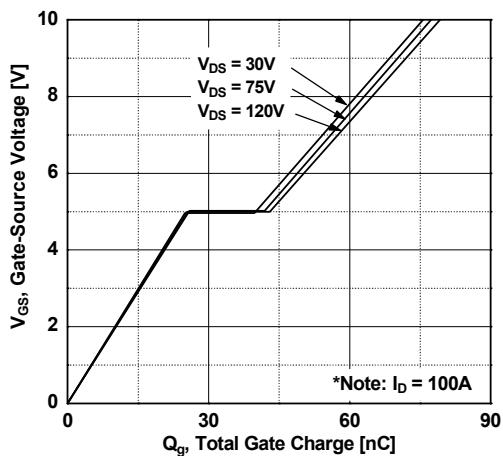


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

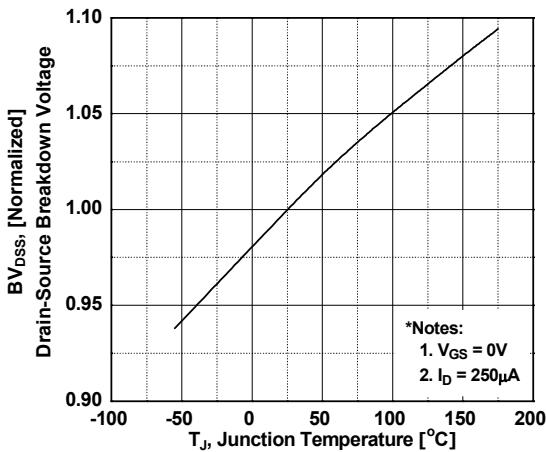


Figure 9. Maximum Safe Operating Area vs. Case Temperature

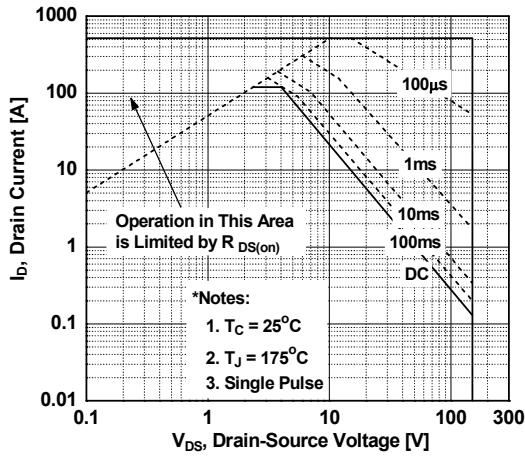


Figure 11. Eoss vs. Drain to Source Voltage

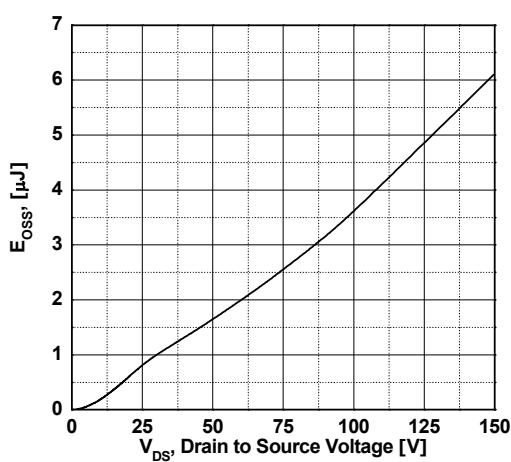


Figure 8. On-Resistance Variation vs. Temperature

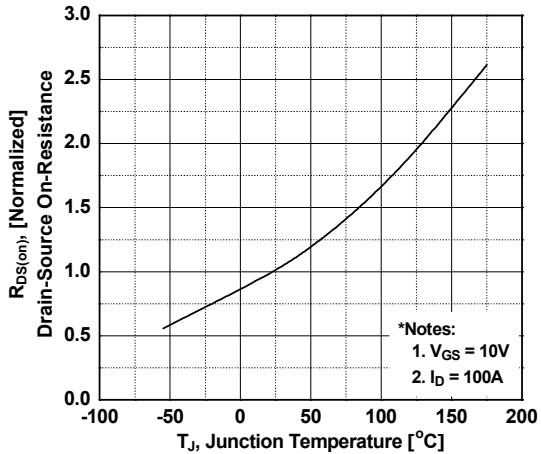


Figure 10. Maximum Drain Current

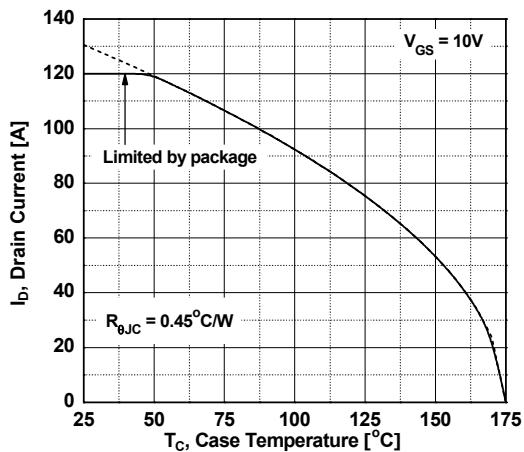
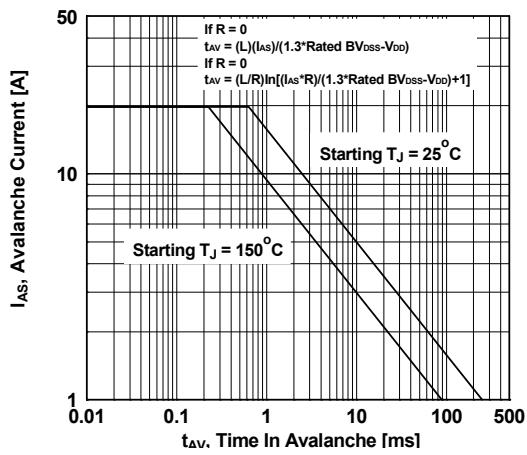
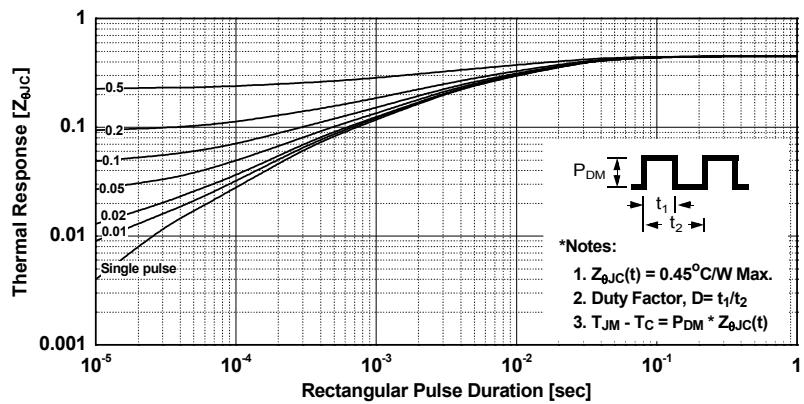


Figure 12. Unclamped Inductive Switching Capability

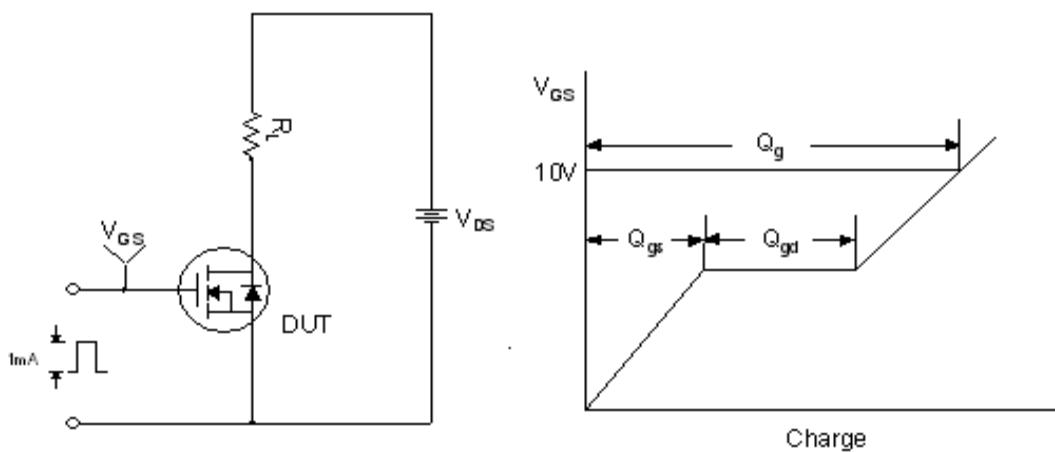


Typical Performance Characteristics (Continued)

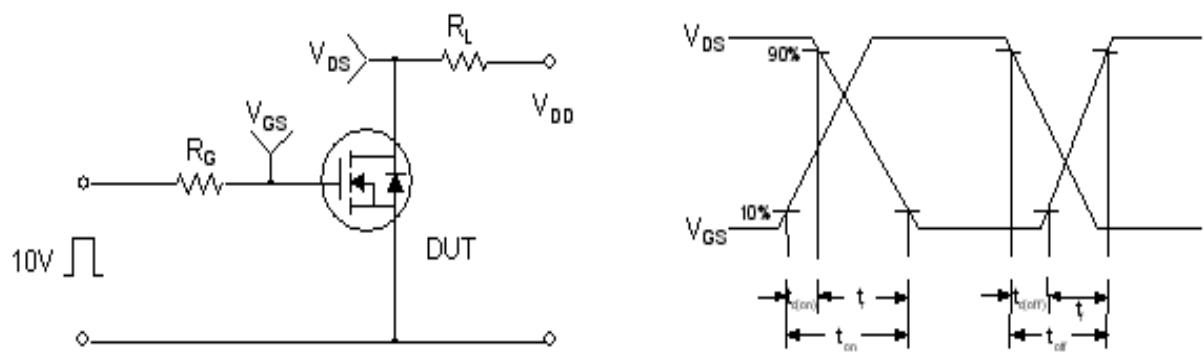
Figure 13. Transient Thermal Response Curve



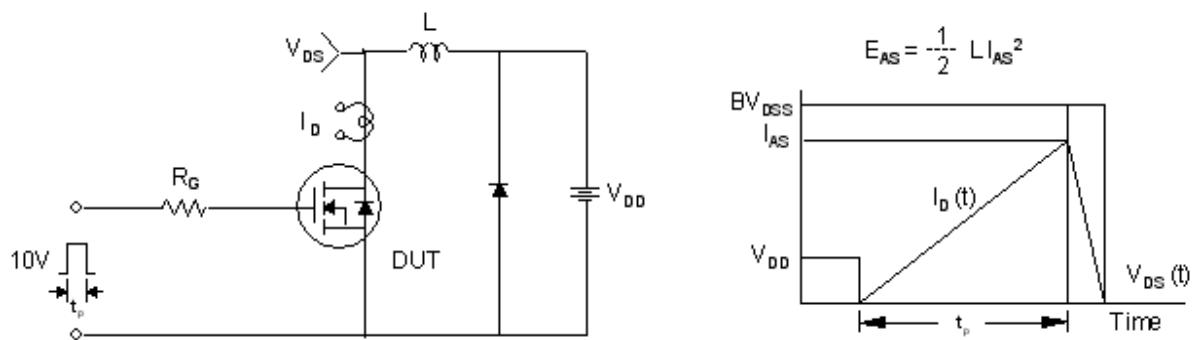
Gate Charge Test Circuit & Waveform



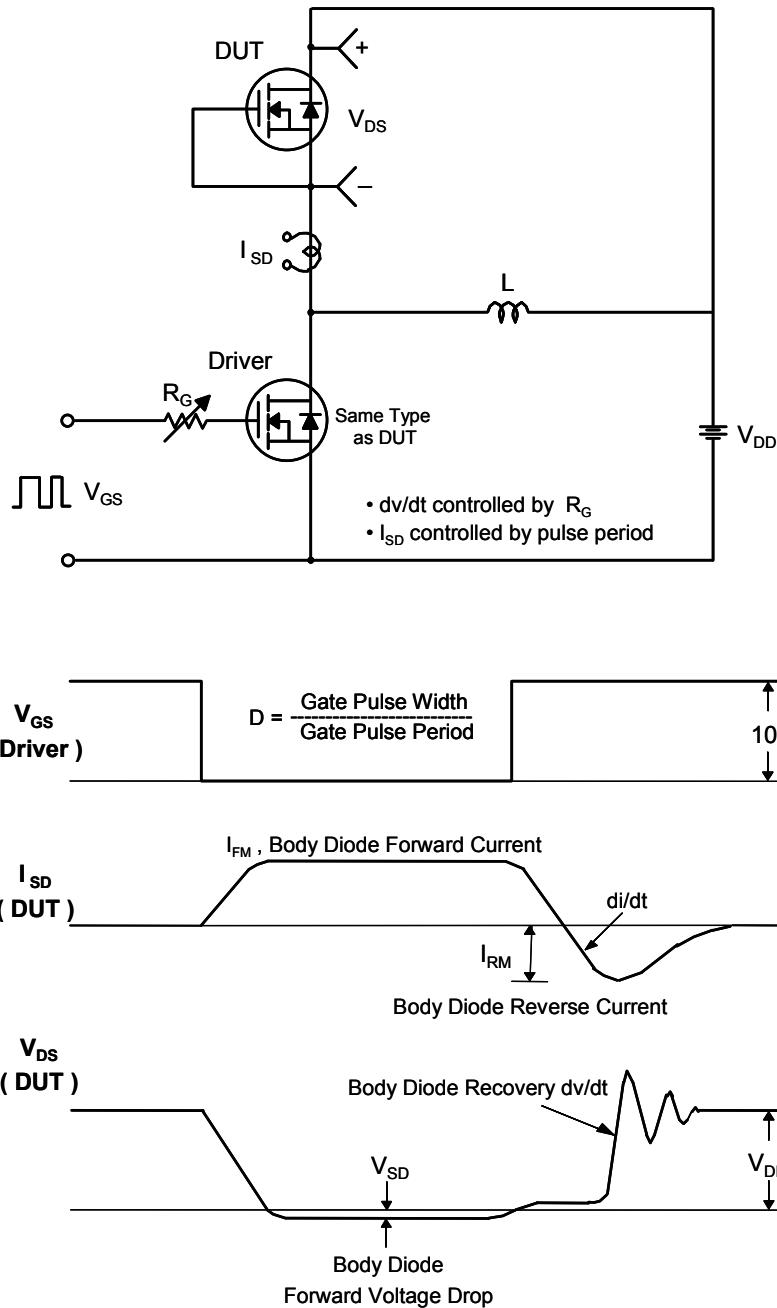
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



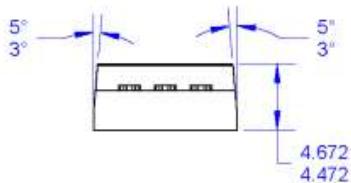
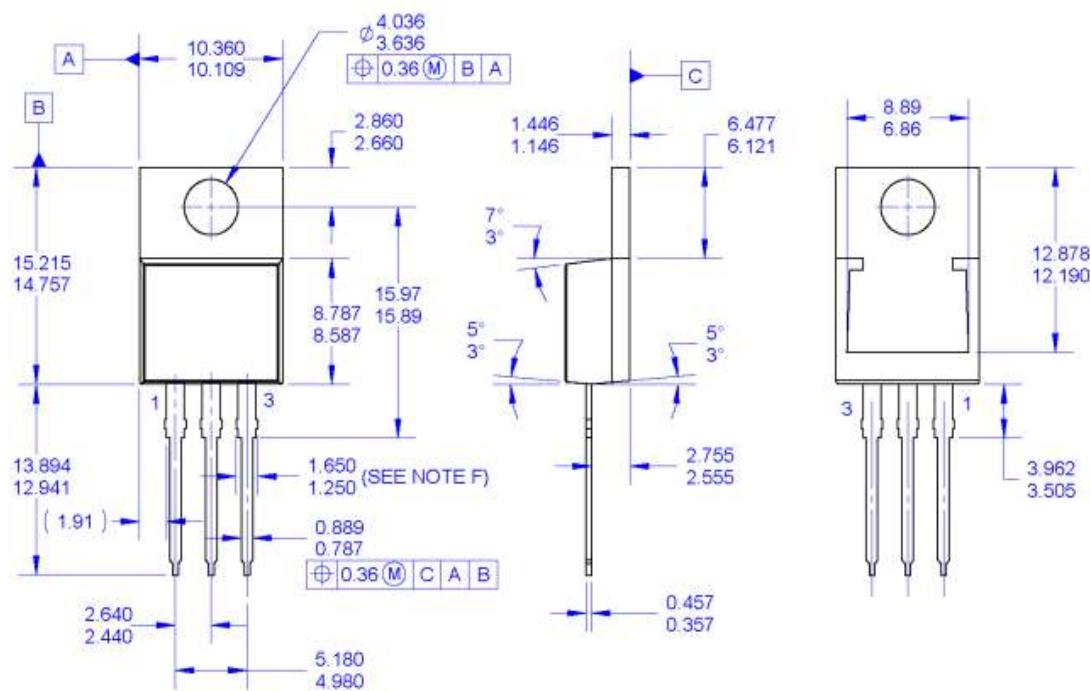
Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-220

(F102: Trimmed Leads)



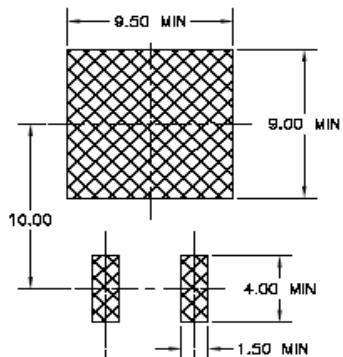
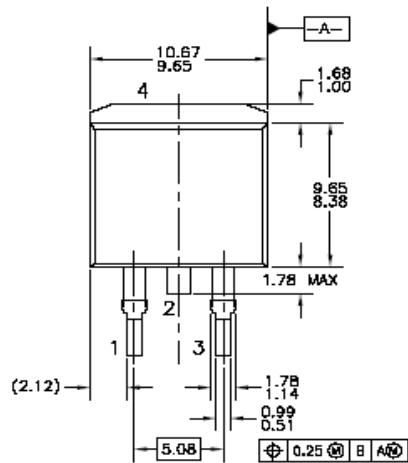
NOTES

- A. PACKAGE REFERENCE: JEDEC TO220 VARIATION AB
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- E. THIS PACKAGE IS FSZ2 INTERNAL PRODUCTION AND INTENDED FOR DELTA CUSTOMER ONLY.
- F. MAX WIDTH FOR F102 DEVICE = 1.35mm.
- G. DRAWING FILE NAME: TO220T03REV2

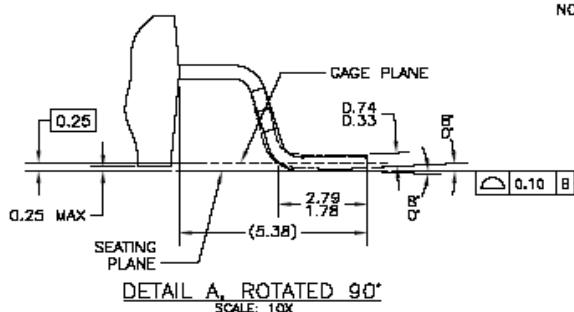
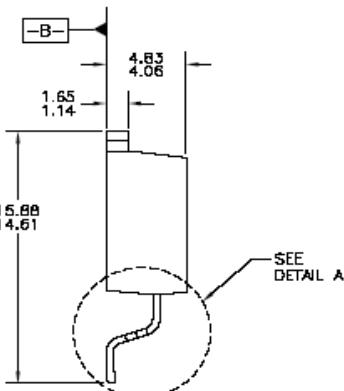
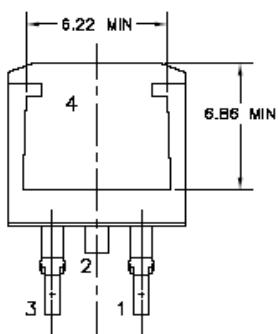
Dimensions in Millimeters

Mechanical Dimensions

D²PAK



LAND PATTERN RECOMMENDATION



NOTES: UNLESS OTHERWISE SPECIFIED

- A) ALL DIMENSIONS ARE IN MILLIMETERS.
- B) REFERENCE JEDEC, TO-263, ISSUE D, VARIATION AB, DATED JULY 2003.
- C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5M - 1982.
- D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE).
- E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.

Dimensions in Millimeters


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