FAIRCHILD SEMICONDUCTOR®

February 2007

UniFET™

FDD6N25 / FDU6N25

250V N-Channel MOSFET

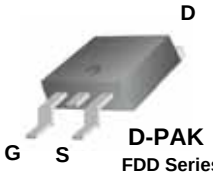
Features

- 4.4A, 250V, $R_{DS(on)}$ = 1.1Ω @V_{GS} = 10 V
- Low gate charge (typical 4.5 nC)
- Low C_{rss} (typical 5 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

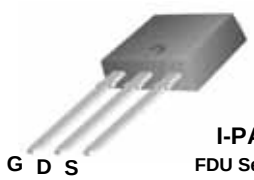
Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, DMOS technology.

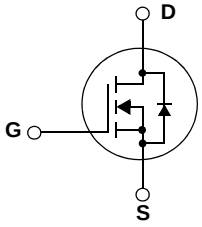
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficient switched mode power supplies and active power factor correction.



D-PAK
FDD Series



I-PAK
FDU Series



Absolute Maximum Ratings

Symbol	Parameter		FDD6N25 / FDU6N25	Unit
V_{DSS}	Drain-Source Voltage		250	V
I_D	Drain Current - Continuous (T_C = 25°C) - Continuous (T_C = 100°C)		4.4 2.6	A A
I_{DM}	Drain Current - Pulsed	(Note 1)	18	A
V_{GSS}	Gate-Source voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	45	mJ
I_{AR}	Avalanche Current	(Note 1)	4.4	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	5	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns
P_D	Power Dissipation (T_C = 25°C) - Derate above 25°C		50 0.4	W W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	2.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	110	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD6N25	FDD6N25TM	D-PAK	380mm	16mm	2500
FDD6N25	FDD6N25TF	D-PAK	380mm	16mm	2000
FDU6N25	FDU6N25TU	I-PAK	-	-	70

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	250	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	--	0.25	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 250V, V_{GS} = 0V V_{DS} = 200V, T_C = 125°C	-- --	-- --	1 10	μA μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 2.2A	--	0.9	1.1	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40V, I_D = 2.2A (Note 4)	--	5.5	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	--	194	250	pF
C_{oss}	Output Capacitance		--	38	50	pF
C_{rss}	Reverse Transfer Capacitance		--	5	8	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 125V, I_D = 6A R_G = 25Ω (Note 4, 5)	--	10	30	ns
t_r	Turn-On Rise Time		--	25	60	ns
$t_{d(off)}$	Turn-Off Delay Time		--	7	24	ns
t_f	Turn-Off Fall Time		--	12	34	ns
Q_g	Total Gate Charge	V_{DS} = 200V, I_D = 6A V_{GS} = 10V (Note 4, 5)	--	4.5	6	nC
Q_{gs}	Gate-Source Charge		--	1.5	--	nC
Q_{gd}	Gate-Drain Charge		--	1.8	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4.4	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	18	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 4.4A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_S = 6A dI_F/dt =100A/μs (Note 4)	--	145	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.55	--	μC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 3.7mH, I_{AS} = 4.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 4.4A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

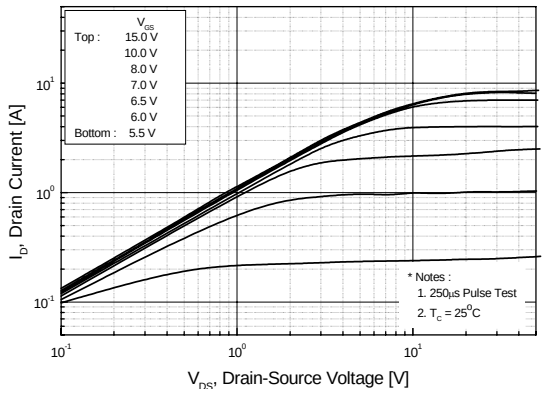


Figure 2. Transfer Characteristics

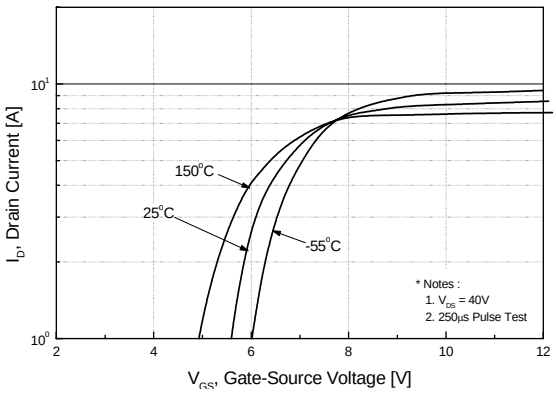


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

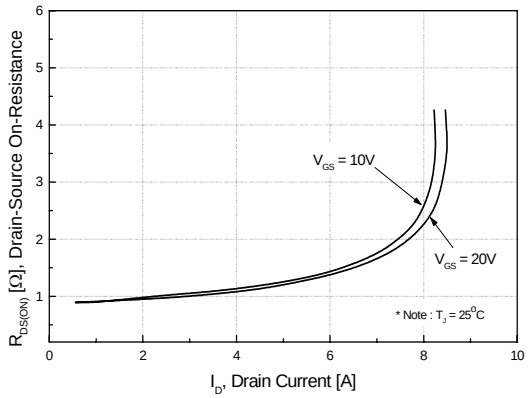


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

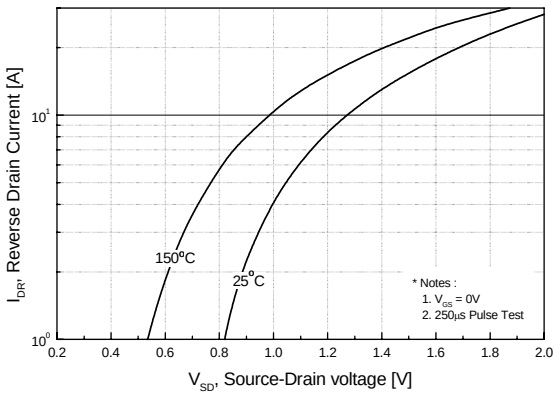


Figure 5. Capacitance Characteristics

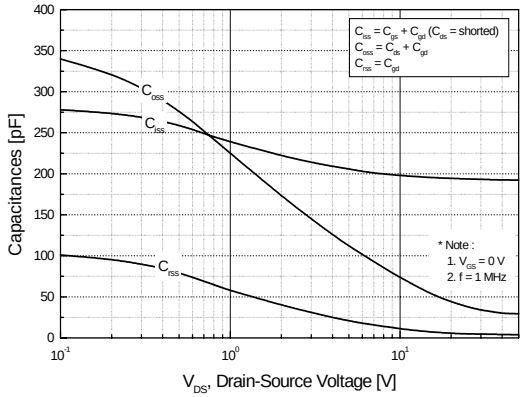
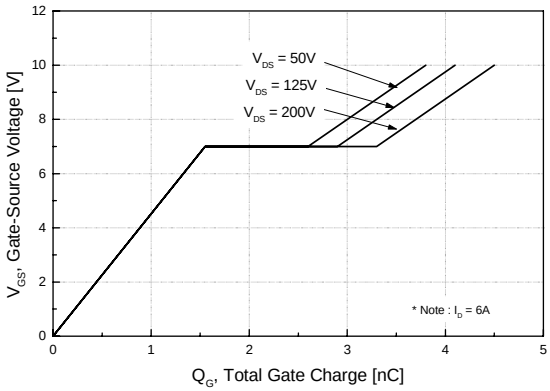


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

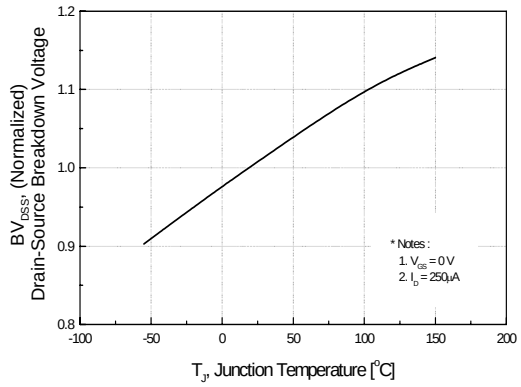


Figure 8. On-Resistance Variation vs. Temperature

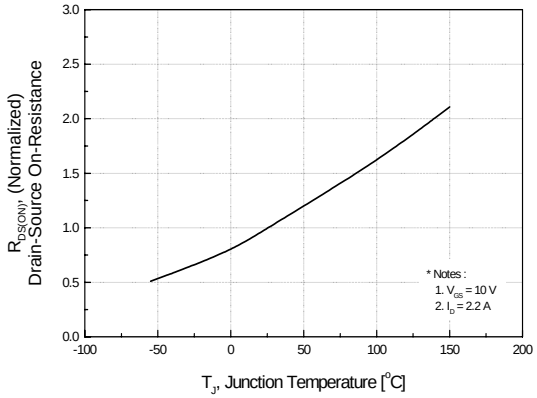


Figure 9. Maximum Safe Operating Area

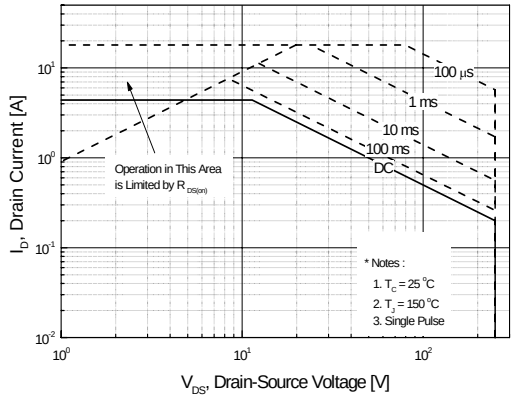


Figure 10. Maximum Drain Current vs. Case Temperature

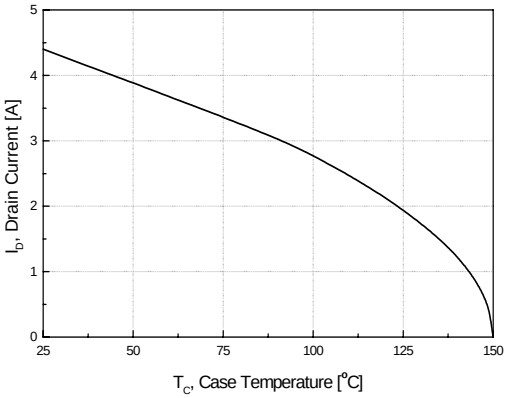
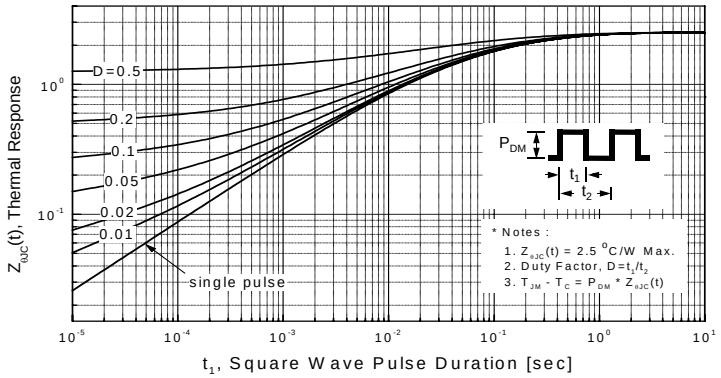
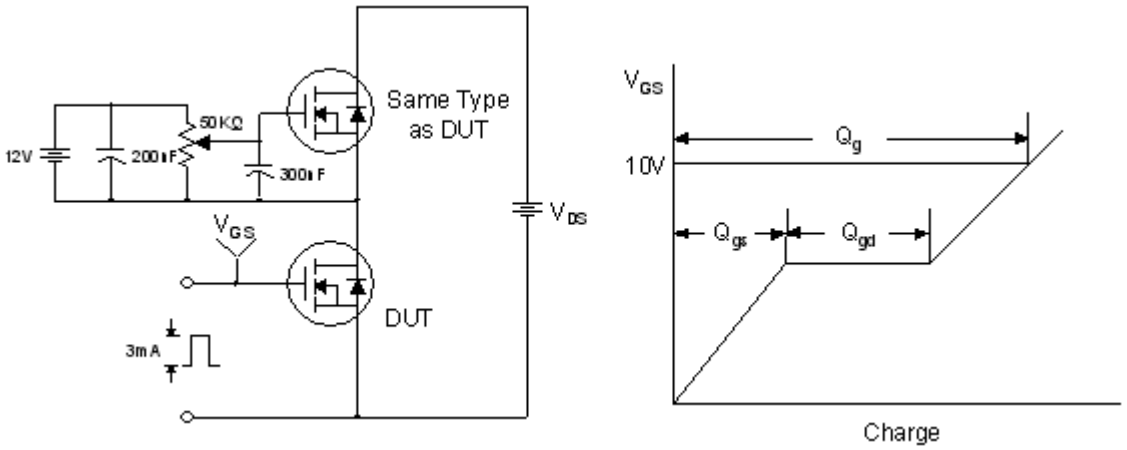


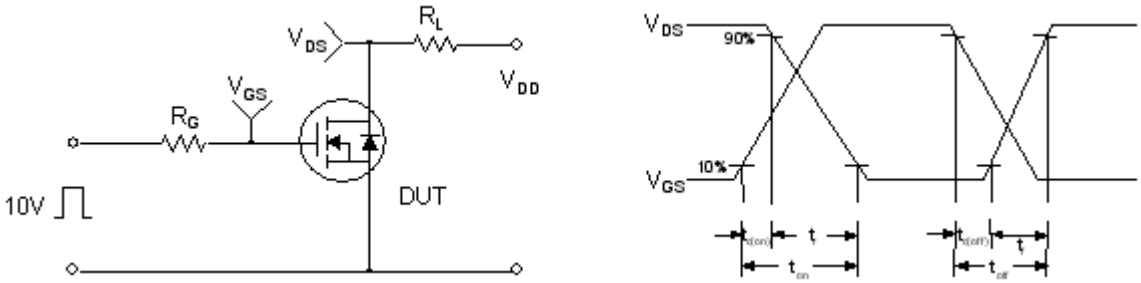
Figure 11. Transient Thermal Response Curve



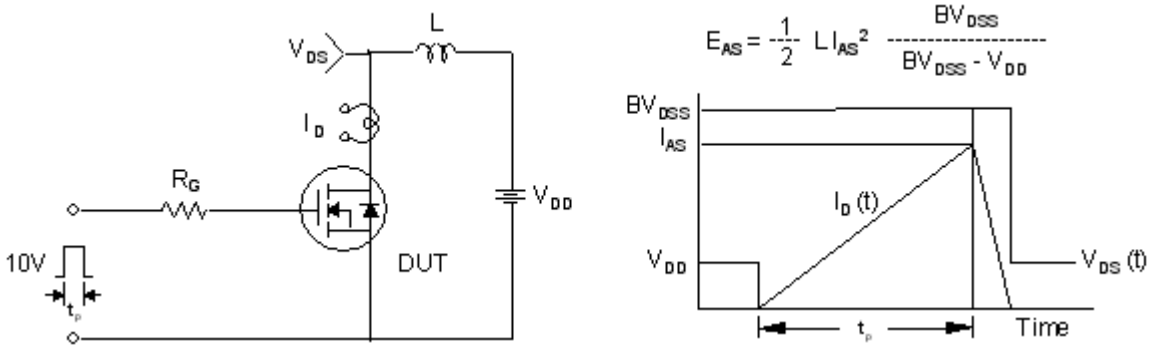
Gate Charge Test Circuit & Waveform



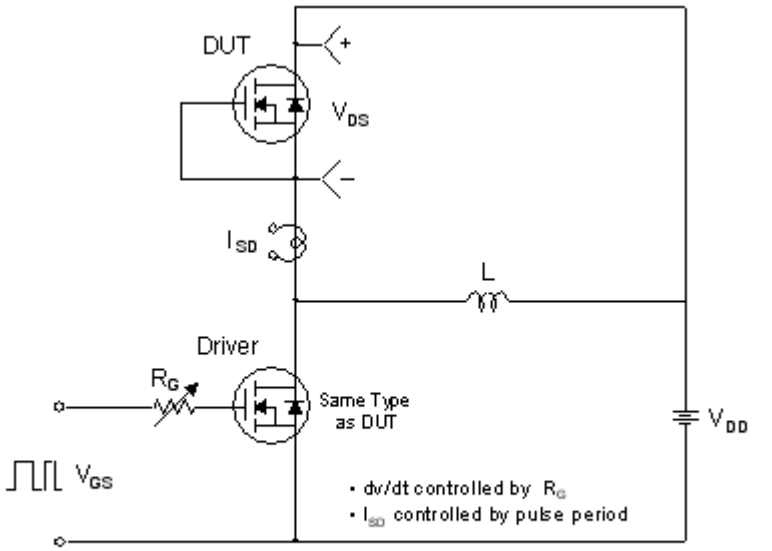
Resistive Switching Test Circuit & Waveforms

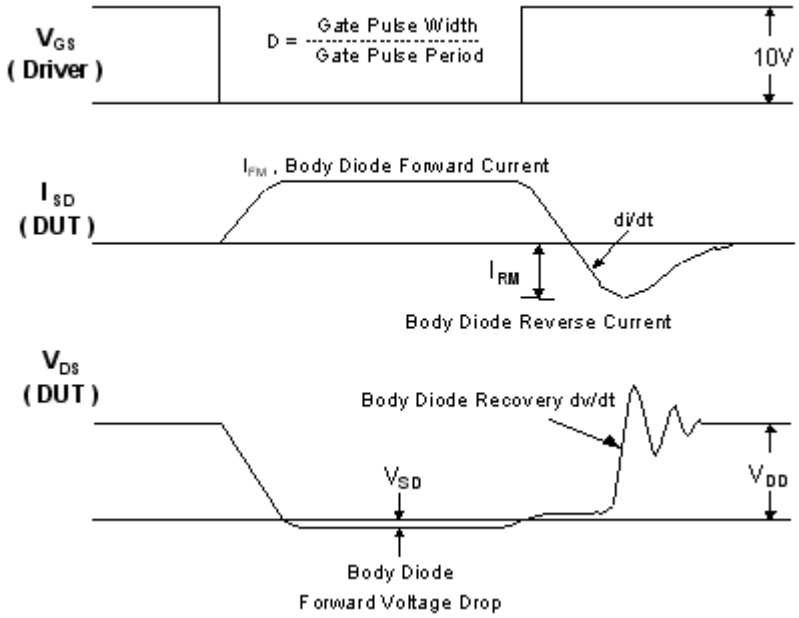


Unclamped Inductive Switching Test Circuit & Waveforms



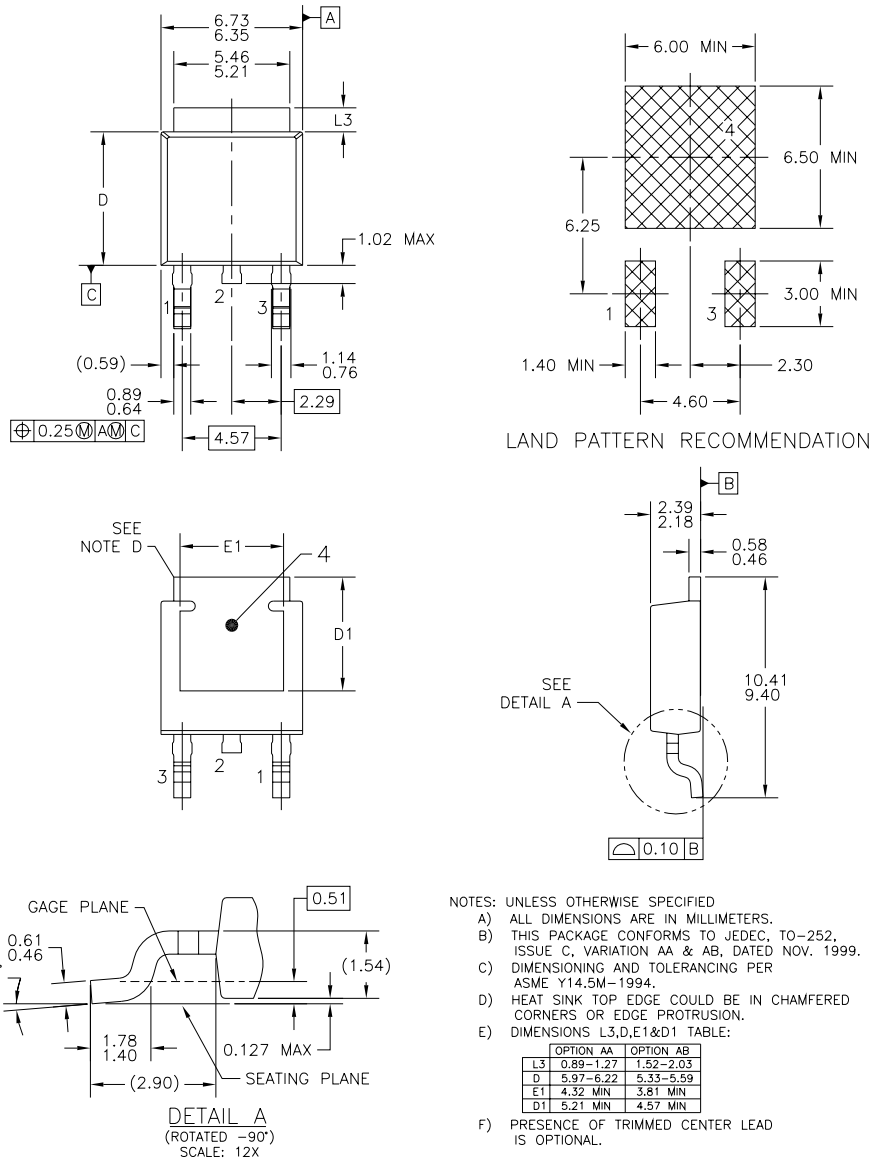
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

D-PAK



NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.

B) THIS PACKAGE CONFORMS TO JEDEC, TO−252, ISSUE C, VARIATION AA & AB, DATED NOV. 1999.

C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M−1994.

D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.

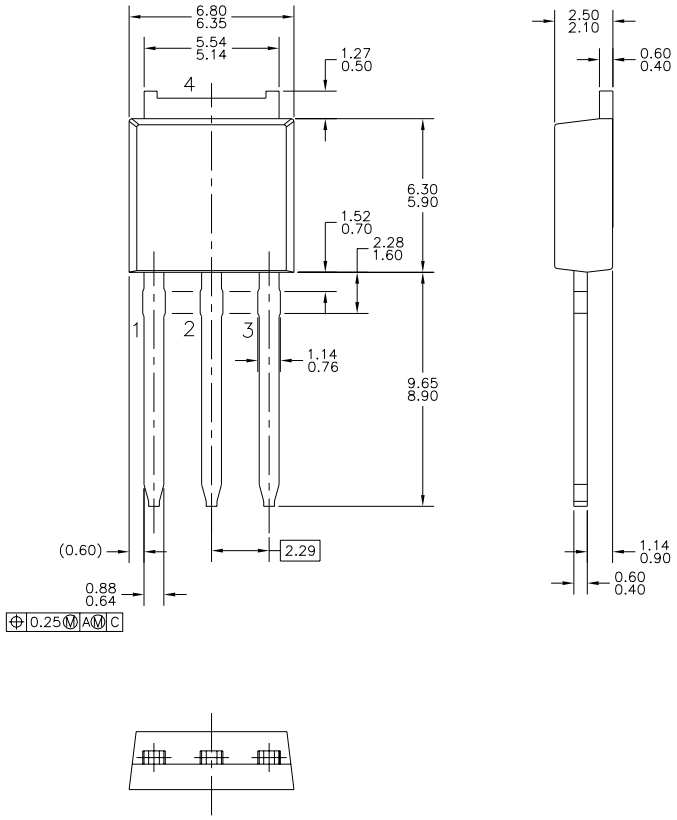
E) DIMENSIONS L3,D,E1&D1 TABLE:

	OPTION AA	OPTION AB
L3	0.89−1.27	1.52−2.03
D	5.97−6.22	5.33−5.59
E1	4.32 MIN	3.81 MIN
D1	5.21 MIN	4.57 MIN

F) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.

Mechanical Dimensions

I-PAK



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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This 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	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only.

Rev. I23

FDD6N25

250V N-Channel MOSFET

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General description

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- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

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Product status/pricing/packaging

BUY

Product	Product status	Pb-free Status	Pricing*	Package type	Leads	Packing method	Package Marking Convention**

FDD6N25TF	Full Production	Full Production	$0.54	TO-252(DPAK)	2	TAPE REEL	Line 1: **$Y** (Fairchild logo) &**Z** (Asm. Plant Code) &E&**3** (3-Digit Date Code) Line 2: FDD Line 3: 6N25
FDD6N25TM	Full Production	Full Production	$0.56	TO-252(DPAK)	2	TAPE REEL	Line 1: **$Y** (Fairchild logo) &**Z** (Asm. Plant Code) &E&**3** (3-Digit Date Code) Line 2: FDD Line 3: 6N25

* Fairchild 1,000 piece Budgetary Pricing
** A sample button will appear if the part is available through Fairchild's on-line samples program. If there is no sample button, please contact a Fairchild distributor to obtain samples

Indicates product with Pb-free second-level interconnect. For more information click here.

Package marking information for product FDD6N25 is available. Click here for more information .

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Qualification Support

Click on a product for detailed qualification data

Product
FDD6N25TF
FDD6N25TM

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