

FDA75N28

280V N-Channel MOSFET

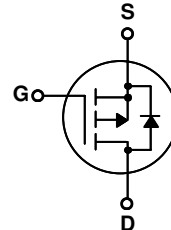
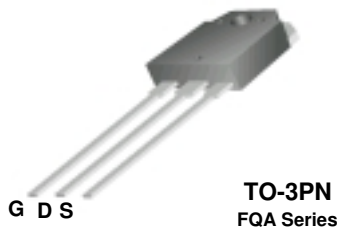
Features

- 75A, 280V, $R_{DS(on)} = 0.041\Omega @ V_{GS} = 10\text{ V}$
- Low gate charge (typical 111 nC)
- Low C_{rss} (typical 90 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.



Absolute Maximum Ratings

Symbol	Parameter	FDA75N28	Unit
V_{DSS}	Drain-Source Voltage	280	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	75 45	A A
I_{DM}	Drain Current - Pulsed (Note 1)	300	A
V_{GSS}	Gate-Source voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	3080	mJ
I_{AR}	Avalanche Current (Note 1)	75	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	52	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	520 4.2	W 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 Purpose, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Min.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.24	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink	0.24	--	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ\text{C}/\text{W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDA75N28	FDA75N28	TO-3PN	--	--	30

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	280	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25°C	--	0.28	--	$V/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 280V, V_{GS} = 0V$ $V_{DS} = 224V, T_C = 125^\circ\text{C}$	--	--	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	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 37.5A$	--	0.035	0.041	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40V, I_D = 37.5A$ (Note 4)	--	75	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	--	5040	6700	pF
C_{oss}	Output Capacitance		--	915	1215	pF
C_{rSS}	Reverse Transfer Capacitance		--	90	135	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 140V, I_D = 75A$ $R_G = 25\Omega$ (Note 4, 5)	--	105	146	ns
t_r	Turn-On Rise Time		--	580	538	ns
$t_{d(off)}$	Turn-Off Delay Time		--	190	418	ns
t_f	Turn-Off Fall Time		--	310	262	ns
Q_g	Total Gate Charge	$V_{DS} = 224V, I_D = 75A$ $V_{GS} = 10V$ (Note 4, 5)	--	111	144	nC
Q_{gs}	Gate-Source Charge		--	31	--	nC
Q_{gd}	Gate-Drain Charge		--	49	--	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	$V_{GS} = 0V, I_S = 75A$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_S = 75A$	--	320	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt = 100A/\mu s$ (Note 4)	--	3.5	--	μC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 0.9\text{mH}, I_{AS} = 75A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 75A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

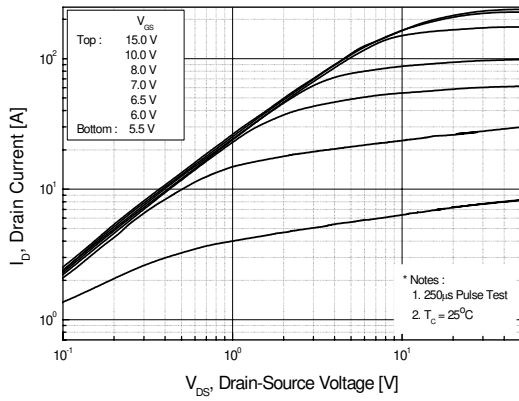


Figure 2. Transfer Characteristics

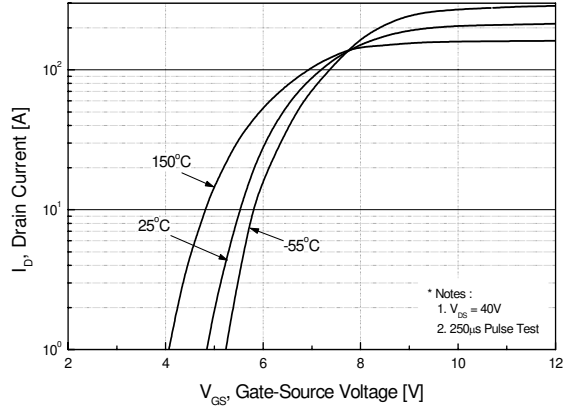


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

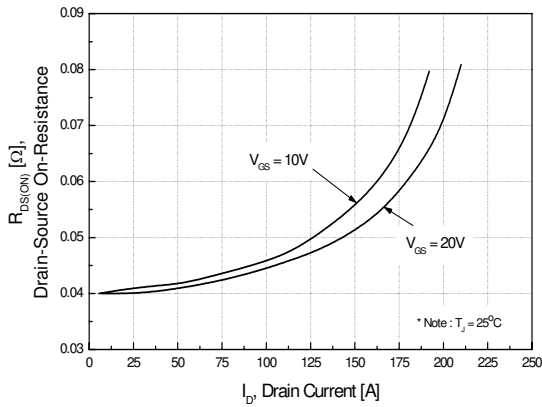


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

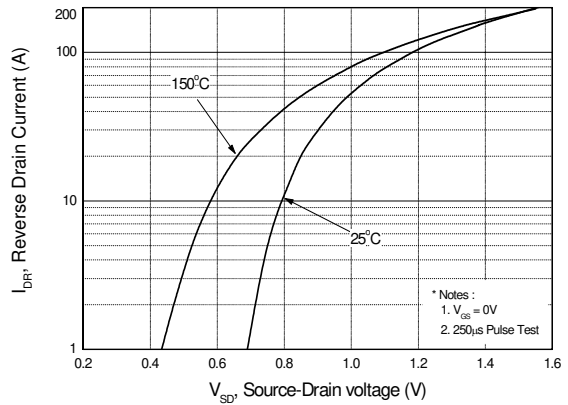


Figure 5. Capacitance Characteristics

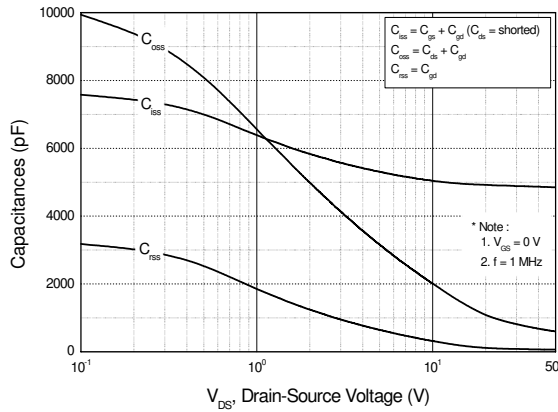
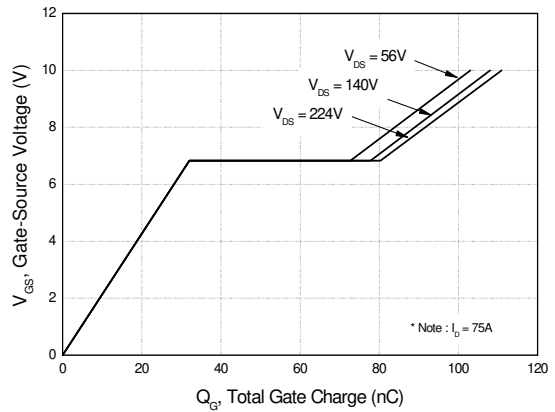


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

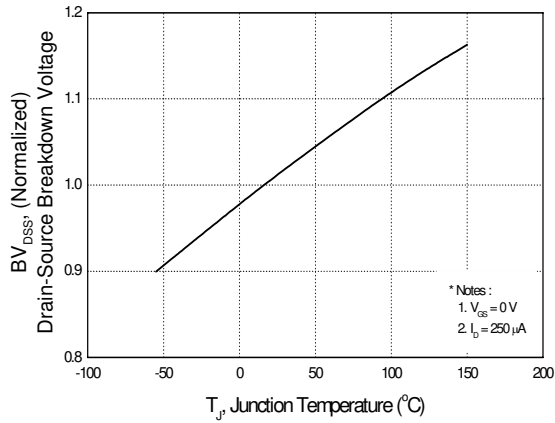


Figure 8. On-Resistance Variation vs. Temperature

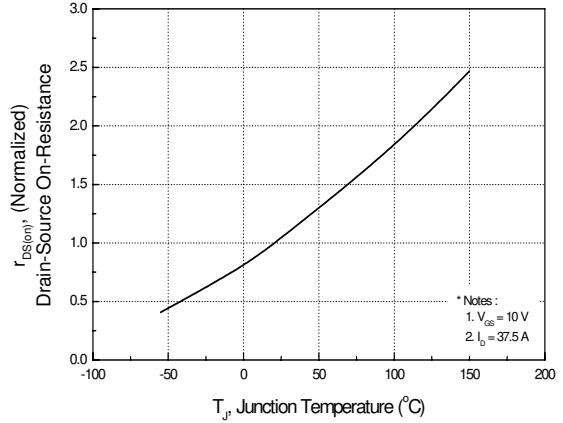


Figure 9. Safe Operating Area

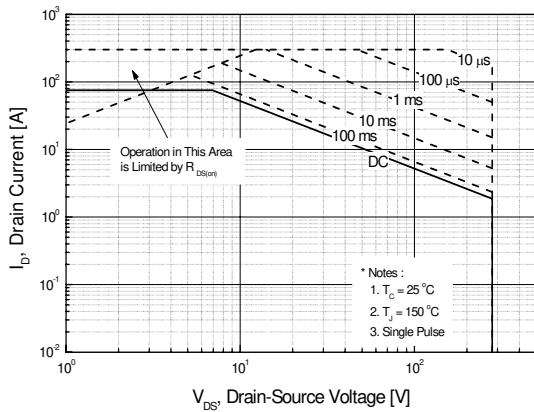


Figure 10. Maximum Drain Current vs. Case Temperature

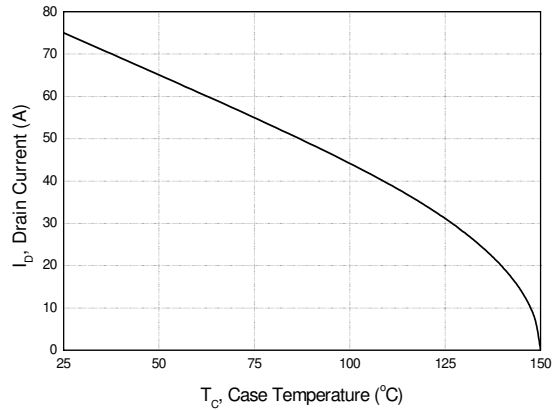
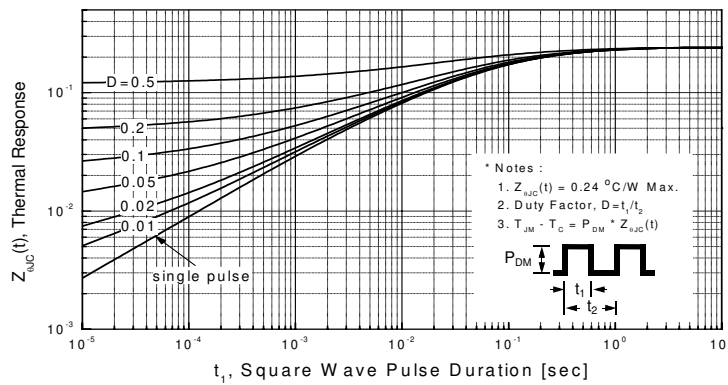
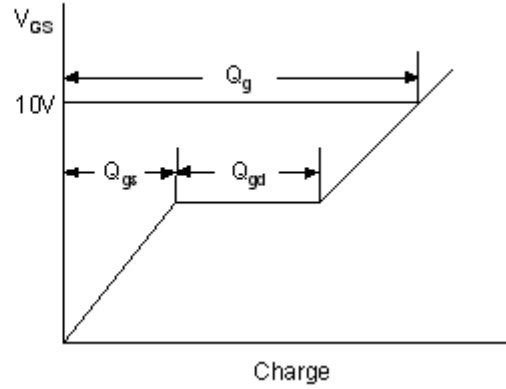


Figure 11. Transient Thermal Response Curve



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

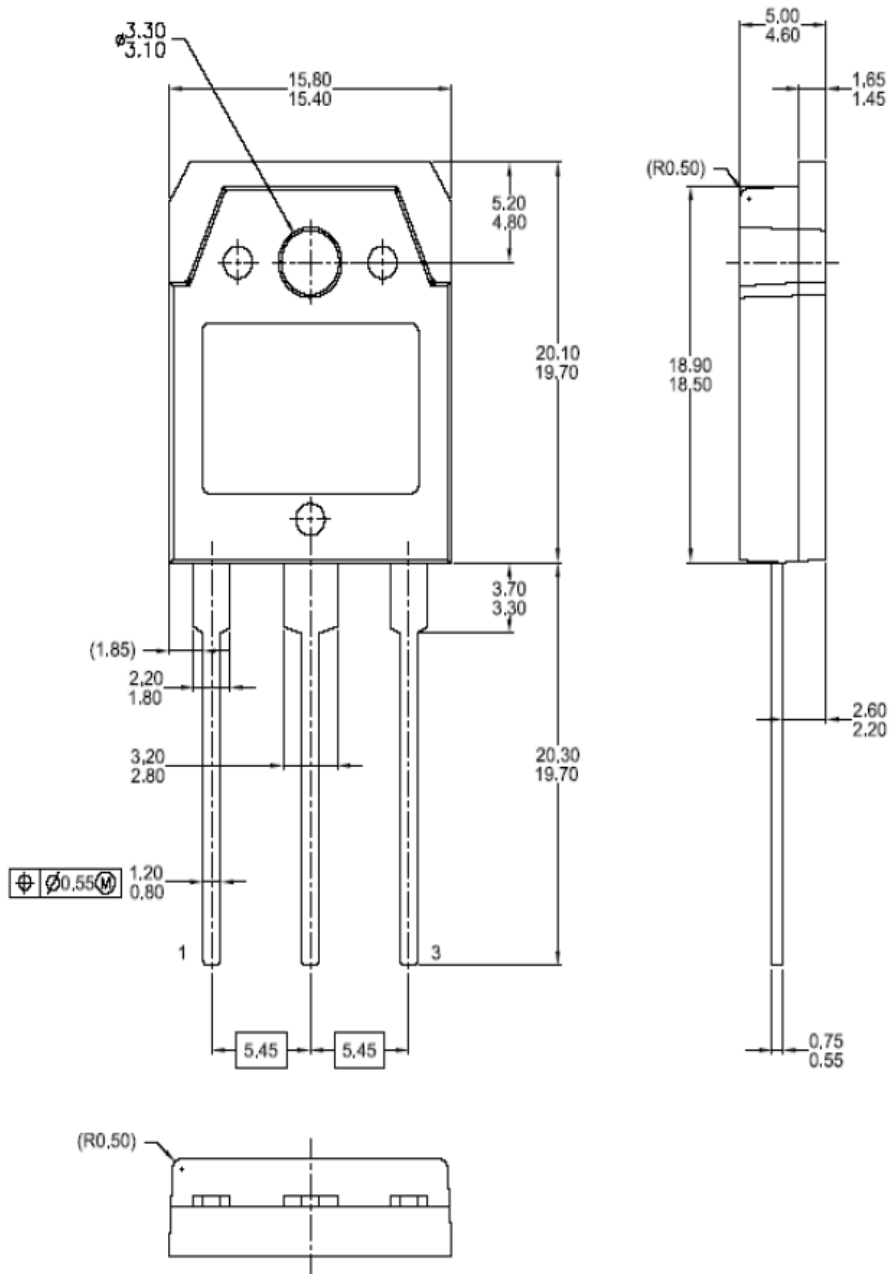


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-3PN



Dimensions in Millimeters

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FAST®	MicroFET™	QS™	TinyBuck™	
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