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January 2014

FDD390N15ALZ

N-Channel PowerTrench[®] MOSFET 150 V, 26 A, 42 m Ω

Features

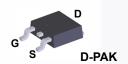
- $R_{DS(on)}$ = 33.4 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 26 A
- $R_{DS(on)}$ = 42.2 m Ω (Typ.) @ V_{GS} = 4.5 V, I_D = 20 A
- · Fast Switching Speed
- Low Gate Charge, Q_G = 17.6 nC (Typ.)
- High Performance Trench Technology for Extremely Low $R_{\mbox{\footnotesize{DS(on)}}}$
- · High Power and Current Handling Capability
- · RoHS Compliant

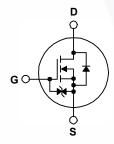
Description

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

Applications

- · Consumer Applicances
- LED TV
- · Synchronous Rectification
- · Uninterruptible Power Supplies
- · Micro Solar Inverter





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol		Parameter		FDD390N15ALZ	Unit
V _{DSS}	Drain to Source Voltage	Orain to Source Voltage			V
V _{GSS}	Gate to Source Voltage			±20	V
	Drain Current	- Continuous (T _C = 25°C)		26	^
'D	Diain Current	- Continuous (T _C = 100°C)		17	_ A
I _{DM}	Drain Current	- Pulsed	(Note 1)	104	Α
E _{AS}	Single Pulsed Avalanche E	Single Pulsed Avalanche Energy (Note 2)		96	mJ
dv/dt	Peak Diode Recovery dv/d	t	(Note 3)	13	V/ns
D	Dower Dissination	(T _C = 25°C)		63	W
P_{D}	Power Dissipation	- Derate Above 25°C		0.5	W/°C
T _J , T _{STG}	Operating and Storage Ter	nperature Range		-55 to +150	οС
T _L	Maximum Lead Temperatu	re for Soldering, 1/8" from Case for 5 S	Seconds	300	οС

Thermal Characteristics

Symbol	Parameter FDD390N15A		Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	2.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. 87		30/00

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDD390N15ALZ	FDD390N15ALZ	DPAK	Tape and Reel	330 mm	16 mm	2500 units

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

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	cteristics					
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	150	-	-	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	-	0.15	-	V/°C
ı	Zero Gate Voltage Drain Current	V _{DS} = 120 V, V _{GS} = 0 V	-	-	1	μА
IDSS	Zero Gate voltage Drain Current	$V_{DS} = 120 \text{ V}, T_{C} = 125^{\circ}\text{C}$	-	-	500	μА
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±10	μА

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	1.4	-	2.8	V
D	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 26 A	-	33.4	42	mΩ
R _{DS(on)}	on) Static Drain to Source On Resistance	$V_{GS} = 4.5 \text{ V}, I_D = 20 \text{ A}$	-	42.2	64	mΩ
9 _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 26 A	-	50	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	., 75././	0.14	-	1323	1760	pF
C _{oss}	Output Capacitance	$V_{DS} = 75 \text{ V}, V_{C}$	_{SS} = 0 V,	-	93	120	pF
C _{rss}	Reverse Transfer Capacitance	I = 1 WHZ		-	4	6	pF
C _{oss(er)}	Energy Related Output Capacitance	V _{DS} = 75 V, V _C	_{SS} = 0 V	-	165	-	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{GS} = 10 V	V _{DS} = 75 V,	-	17.6	39	nC
Q _{g(tot)}	Total Gate Charge at 5V	V _{GS} = 4.5 V	I _D = 26 A	-	8.1	10.5	nC
Q_{gs}	Gate to Source Gate Charge			-	4.7	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		(Note 4)	-	2.3	-	nC
ESR	Equivalent Series Resistance (G-S)	f = 1 MHz		-	1.48	-	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time		-/	12.8	35.6	ns
t _r		$V_{DD} = 75 \text{ V}, I_D = 26 \text{ A},$	-	9.3	28.6	ns
t _{d(off)}	Turn-Off Delay Time	$V_{GS} = 10 \text{ V}, R_G = 4.7\Omega$	/ -	26.9	63.8	ns
t _f	Turn-Off Fall Time	(Note 4)	_	3.2	16.4	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	26	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	104	Α
V_{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 26 A	-	-	1.25	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 26 A,	-	70	-	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100 A/\mu s$	-	169	-	nC

Notes

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. L = 3 mH, I_{AS} = 6.75 A, starting T_J = 25°C.
- 3. $I_{SD} \le 26$ A, di/dt ≤ 200 A/ μ s, $V_{DD} \le BV_{DSS}$, starting T_J = 25°C.
- 4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

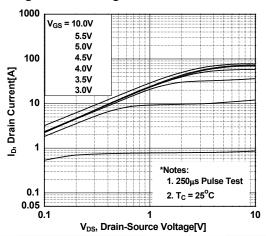


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

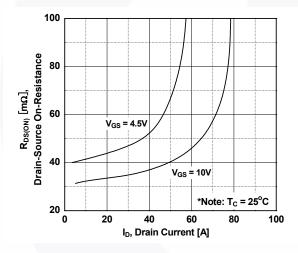


Figure 5. Capacitance Characteristics

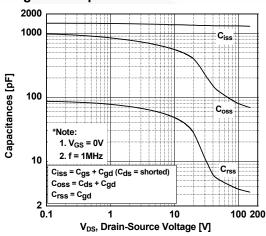


Figure 2. Transfer Characteristics

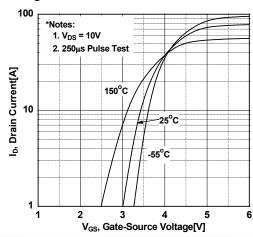


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

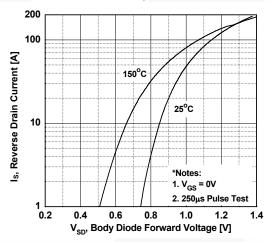
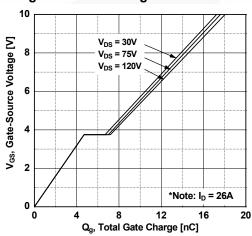


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

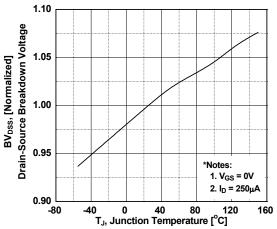


Figure 8. On-Resistance Variation vs. Temperature

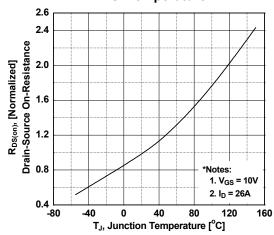


Figure 9. Maximum Safe Operating Area

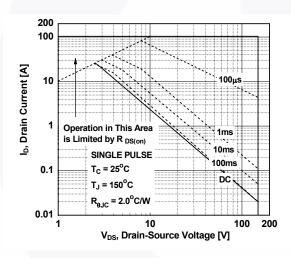


Figure 10. Maximum Drain Current vs. Case Temperature

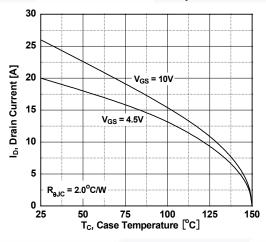


Figure 11. Eoss vs. Drain to Source Voltage

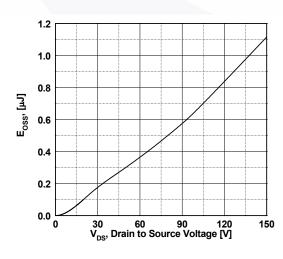
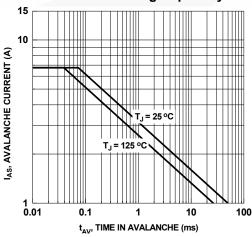
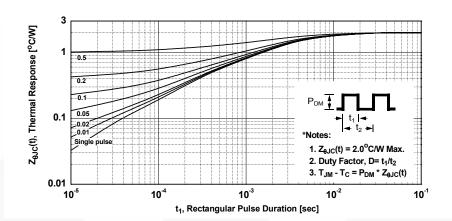


Figure 12. Unclamped Inductive Switching Capability



Typical Performance Characteristics (Continued)

Figure 13. Transient Thermal Response Curve



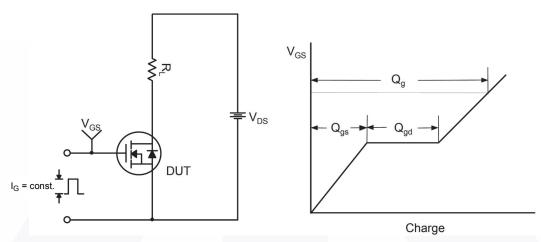


Figure 14. Gate Charge Test Circuit & Waveform

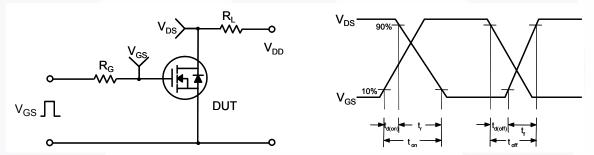


Figure 15. Resistive Switching Test Circuit & Waveforms

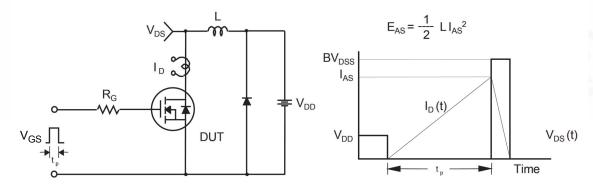


Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms

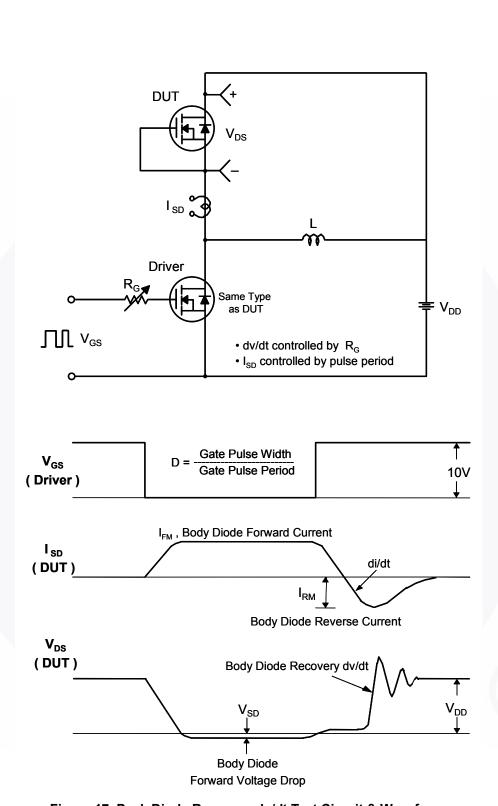


Figure 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

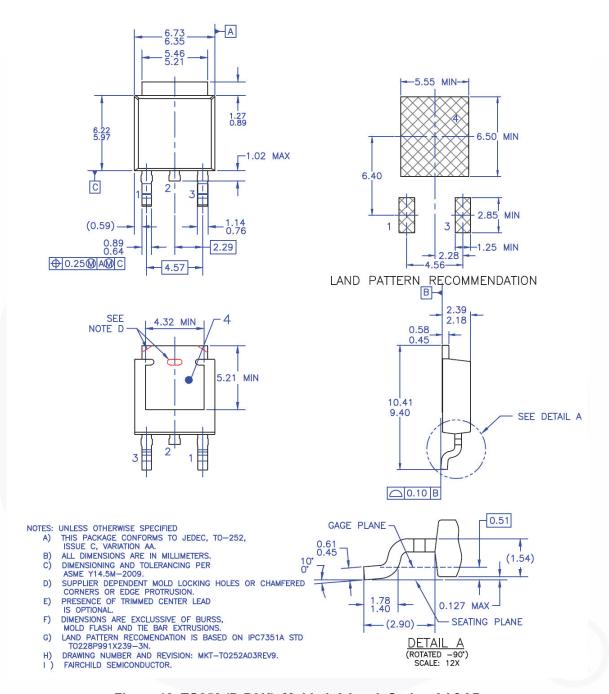


Figure 18. TO252 (D-PAK), Molded, 3-Lead, Option AA&AB

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