

March 2015

FDH055N15A

N-Channel PowerTrench[®] MOSFET 150 V, 167 A, 5.9 m Ω

Features

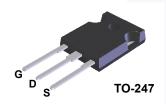
- $R_{DS(on)}$ = 4.8 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 120 A
- · Fast Switching Speed
- · Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- · High Power and Current Handling Capability
- · RoHS Compliant

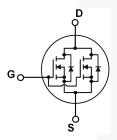
Description

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

Applications

- · Synchronous Rectification for ATX / Sever / Telecom PSU
- · Battery Protection Circuit
- · Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter





Absolute Maximum Ratings $T_C = 25^{\circ}C$ unless otherwise noted.

Symbol		Parameter	FDH055N15A	Unit
V _{DSS}	Drain to Source Voltage		150	V
\/	Cata ta Cauraa Valtaga	- DC	±20	V
V _{GSS} Gate to Source Voltage		- AC (f > 1 Hz)	±30	V
		- Continuous (T _C = 25°C, Silicon Limited)	167*	
I _D	Drain Current	- Continuous (T _C = 100°C, Silicon Limited)	118	Α
		- Continuous (Tc = 25°C, Package Limited)	156	
I _{DM}	Drain Current	- Pulsed (Note 1)	668	Α
E _{AS}	Single Pulsed Avalanche En	ergy (Note 2)	835	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	6.0	V/ns
D	Dawer Dissinction	$(T_C = 25^{\circ}C)$	429	W
P_{D}	Power Dissipation	- Derate Above 25°C	2.86	W/°C
T _J , T _{STG}	Operating and Storage Temp	perature Range	-55 to +175	οС
TI	Maximum Lead Temperature	e for Soldering, 1/8" from Case for 5 Seconds	300	°C

^{*}Calculated continuous current based on maximum allowable junction temperature, Package limitation current is 156 A.

Thermal Characteristics

Symbol	Parameter	FDH055N15A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.35	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	40	C/VV

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDH055N15A	FDH055N15A	TO-247	Tube	N/A	N/A	30 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	-	0.1	-	V/°C
ı	Zoro Coto Voltago Droin Current	V _{DS} = 120 V, V _{GS} = 0 V	-	-	1	
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 120 \text{ V}, T_{C} = 150^{\circ}\text{C}$	-	-	500	μA
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±100	nA

On Characteristics

V_{GS}	S(th)	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	2.0	-	4.0	V
R_{DS}	S(on)	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 120 A	-	4.8	5.9	mΩ
g _{FS}		Forward Transconductance	V _{DS} = 10 V, I _D = 120 A	-	219	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	75.77.77	-	7100	9445	pF
Coss	Output Capacitance	V _{DS} = 75 V, V _{GS} = 0 V, f = 1 MHz		664	885	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1 1011 12	-	23	35	pF
C _{oss(er)}	Energy Related Output Capacitance	V _{DS} = 75 V, V _{GS} = 0 V	-	1159	-	pF
Q _{g(tot)}	Total Gate Charge at 10V		-	92	-	nC
Q _{gs}	Gate to Source Gate Charge	V _{DS} = 75 V, I _D = 120 A,	-	31	-	nC
Q _{gs2}	Gate Charge Threshold to Plateau	$V_{DS} = 75 \text{ V}, I_{D} = 120 \text{ A},$ $V_{GS} = 10 \text{ V}$	-	15	-	nC
Q_{gd}	Gate to Drain "Miller" Charge	(Note	-	16	-	nC
ESR	Equivalent Series Resistance(G-S)	f = 1 MHz	-	1.2	-	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DD} = 75 V, I _D = 120 A,	-	35	80	ns
t _r	Turn-On Rise Time	$V_{GS} = 10 \text{ V}, R_G = 4.7 \Omega$	- /	67	144	ns
t _{d(off)}	Turn-Off Delay Time		-	71	152	ns
t _f	Turn-Off Fall Time	(Note 4)	7/-	21	52	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	167*	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	668	Α
V_{SD}	Drain to Source Diode Forward Voltage V _{GS} = 0 V, I _{SD} = 120 A		-	-	1.25	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 120 A, V _{DS} = 75 V,	-	105	-	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100 A/\mu s$	-	342	-	nC
Q _{rr}	Reverse Recovery Charge	$V_{GS} = 0 \text{ V}, I_{SD} = 30 \text{ A}, V_{DS} = 75 \text{ V},$ $dI_F/dt = 100 \text{ A}/\mu\text{s}$	-	348	- =	nC

Notes

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. Starting T $_{J}$ = 25°C, L = 3 mH, I $_{AS}$ = 23.6 A.
- 3. $I_{SD} \le$ 120 A, di/dt \le 200 A/ μ s, $V_{DD} \le$ BV $_{DSS}$, starting T_J = 25°C.
- Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

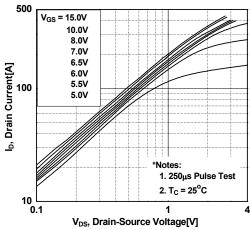


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

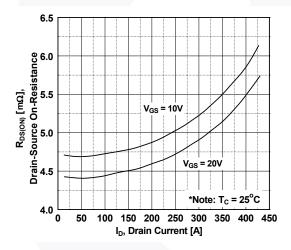


Figure 5. Capacitance Characteristics

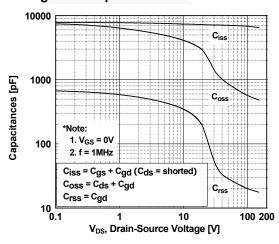


Figure 2. Transfer Characteristics

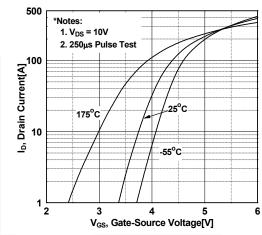


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

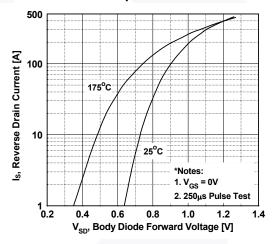
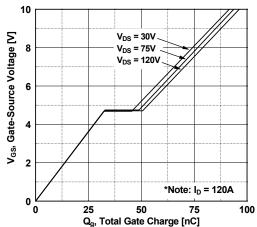


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

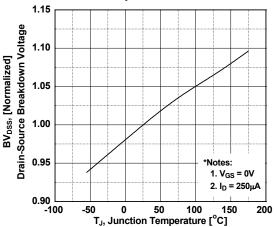


Figure 9. Maximum Safe Operating Area

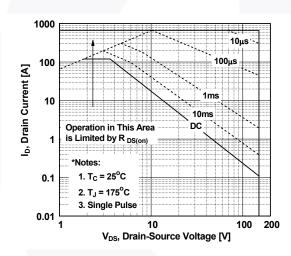


Figure 11. Eoss vs. Drain to Source Voltage

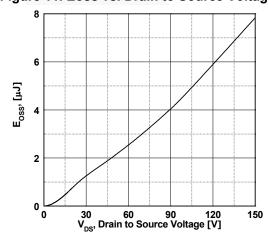


Figure 8. On-Resistance Variation vs. Temperature

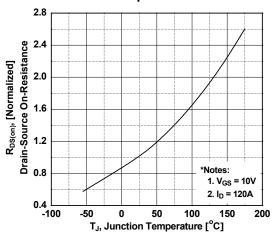
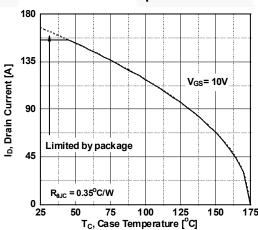
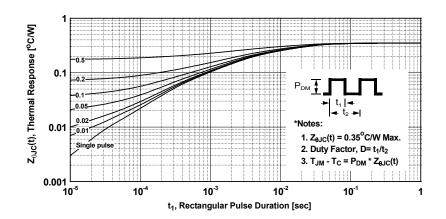


Figure 10. Maximum Drain Current vs. Case Temperature



Typical Performance Characteristics (Continued)

Figure 12. Transient Thermal Response Curve



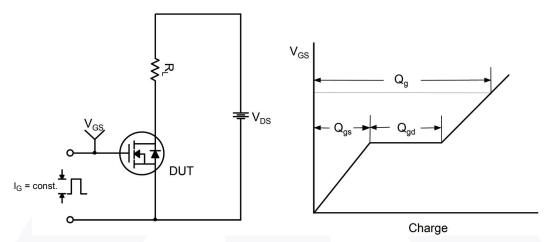


Figure 13. Gate Charge Test Circuit & Waveform

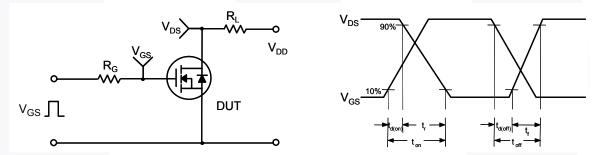


Figure 14. Resistive Switching Test Circuit & Waveforms

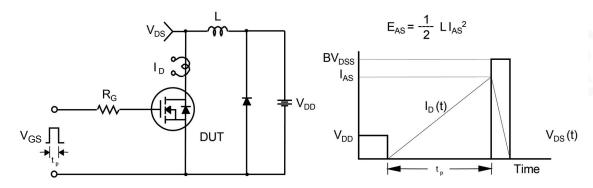


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

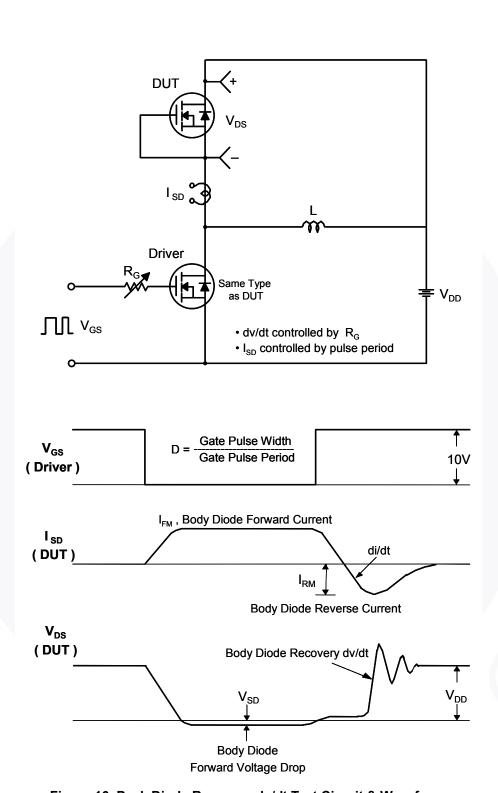
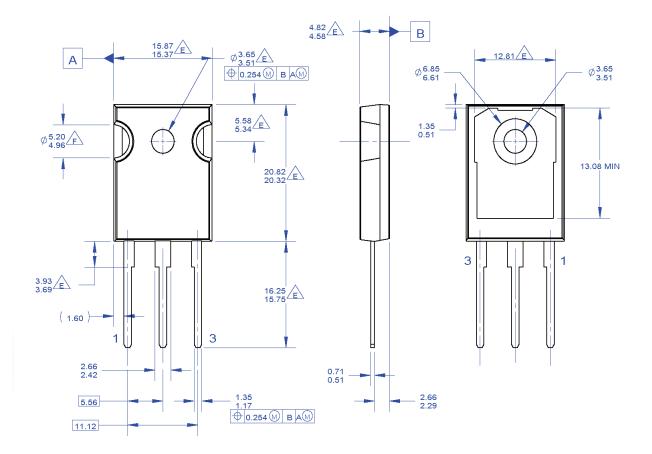


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED.

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Figure 17. TO-247, Molded, 3-Lead, Jedec Variation AB

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