

March 2013

FDA8440

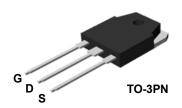
N-Channel Logic Level PowerTrench[®] MOSFET 40 V, 100 A, 2.1 m Ω

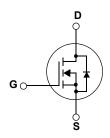
Features

- $R_{DS(on)}$ = 1.46 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 80 A
- $Q_{G(tot)} = 345 \text{ nC (Typ.)} @ V_{GS} = 10 \text{ V}$
- · Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- 160A Guarantee for 2 sec
- · RoHS Compliant

Applications

- · Power tools
- · Motor drives and Uninterruptible Power Supplies
- · Synchronous Rectification
- · Battery Protection Circuit





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

Symbol	Parameter	FDA8440	Unit
V _{DSS}	Drain to Source Voltage	40	V
V _{GSS}	Gate to Source Voltage	±20	V
I _D	Drain Current - Continuous (T _C = 155°C)	100	Α
	- Continuous (T_A = 25°C, V_{GS} = 10V, $R_{\theta JA}$ = 40°C/W)	30	Α
	- Pulsed	500	Α
E _{AS}	Single Pulsed Avalanche Energy (Note 1	1682	mJ
P _D	Power dissipation	306	W
	Derate above 25°C	2.04	W/°C
T _{J,} T _{STG}	Operating and Storage Temperature	-55 to +175	οС

Thermal Characteristics

$R_{ heta JC}$	Thermal Resistance, Junction to Case, Max.	0.49	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. (Note 2)	40	°C/W

Package Marking and Ordering Information

Device Marking Device		Package	Reel Size	Tape Width	Quantity	
FDA8440	FDA8440	TO-3PN	N/A	N/A	30units	

Electrical Characteristics $T_C = 25$ °C unless otherwise noted

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
Off Charac	teristics	-		u.			
BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA		40			V
I _{DSS}		V _{DS} = 32V				1	μΑ
	Zero Gate Voltage Drain Current	V _{GS} = 0V	$T_{\rm C} = 150^{\rm o}{\rm C}$			250	μА
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20V				±100	nA
On Charac	teristics			1	l .		
V _{GS(th)}	Gate to Source Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	4	1		3	V
. ,		V _{GS} = 4.5V, I _D = 80A			1.56	2.2	mΩ
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 80A			1.46	2.1	
		$V_{GS} = 10V, I_D = 80A,$ $T_C = 175^{\circ}C$			2.82	4.1	
Dynamic C	haracteristics	<u> </u>		II.			
C _{iss}	Input Capacitance		V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz		18600	24740	pF
C _{oss}	Output Capacitance				1840	2450	pF
C _{rss}	Reverse Transfer Capacitance	T = 1.0IVID2			1400	2100	pF
R _G	Gate Resistance	V _{GS} = 0.5V, f = 1MHz			1.1		Ω
Q _{g(tot)}	Total Gate Charge at 10V	V _{GS} = 0V to 10V			345	450	nC
Q _{g(2)}	Threshold Gate Charge	V _{GS} = 0V to 2V	V _{DD} = 20V		32.5		nC
Q _{gs}	Gate to Source Gate Charge		I _D = 80A		49		nC
Q _{gs2}	Gate Charge Threshold to Plateau		$I_g = 1.0 mA$		16.5		nC
Q _{gd}	Gate to Drain "Miller" Charge		1		74		nC
Switching	Characteristics (V _{GS} = 10V)						
t _{ON}	Turn-On Time				175	360	ns
t _{d(on)}	Turn-On Delay Time				43	95	ns
t _r	Rise Time	$V_{DD} = 20V, I_D = 80A$ $V_{CS} = 10V, R_{CDM} = 70$	$V_{DD} = 20V, I_D = 80A$ $V_{GS} = 10V, R_{GEN} = 7\Omega$		130	275	ns
t _{d(off)}	Turn-Off Delay Time	'GS 'GEN '-			435	875	ns
t _f	Fall Time				290	590	ns
t _{OFF}	Turn-Off Time	1			730	1470	ns
	rce Diode Characteristics and Maximi	um Ratings		II.	I.		
,,	Source to Drain Diode Voltage	I _{SD} = 80A				1.25	V
V_{SD}		I _{SD} = 40A				1.0	V
t _{rr}	Reverse Recovery Time	$I_{SD} = 75A, dI_{SD}/dt = 10$	I _{SD} = 75A, dI _{SD} /dt = 100A/μs		59		ns
Q _{RR}	Reverse Recovery Charge	$I_{SD} = 75A$, $dI_{SD}/dt = 10$	00A/μs		77		nC

NOTES

^{1:} Starting T_J = 25°C, L = 1mH, I_{AS} = 58A, V_{DD} = 36V, V_{GS} = 10V.

^{2:} Pulse width = 100s

Typical Performance Characteristics

Figure 1. On-Region Characteristics

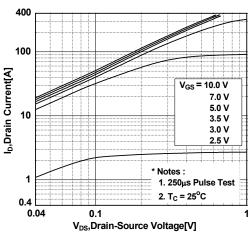


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

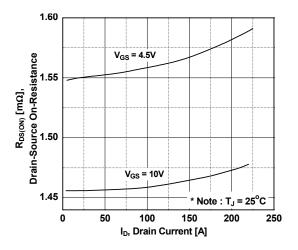


Figure 5. Capacitance Characteristics

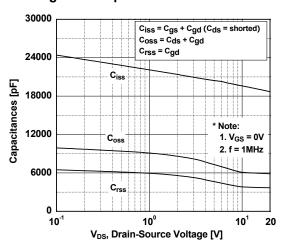


Figure 2. Transfer Characteristics

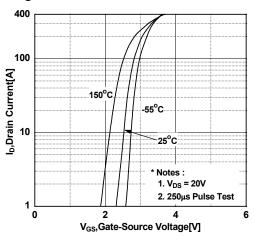


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

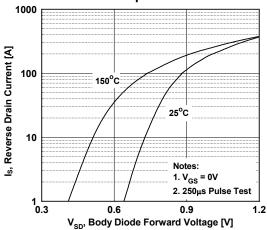
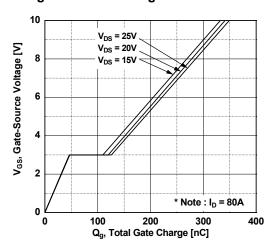


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

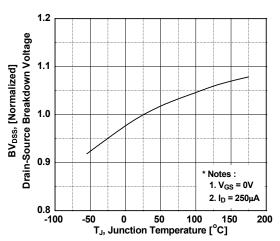


Figure 9. Unclamped Inductive Switching Capability

Figure 8. On-Resistance Variation vs. Temperature

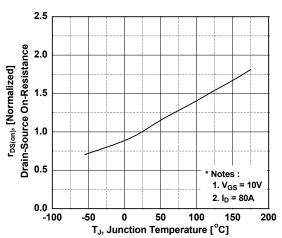
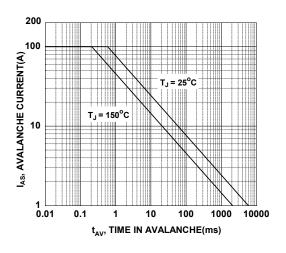


Figure 10. Safe Operating Area



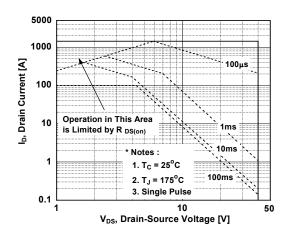
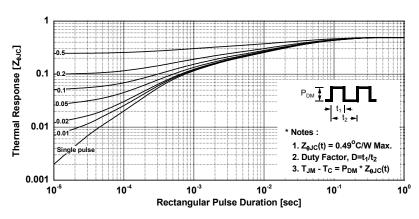
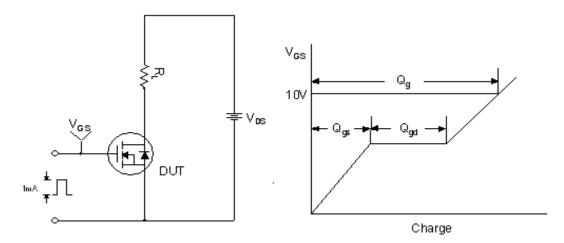


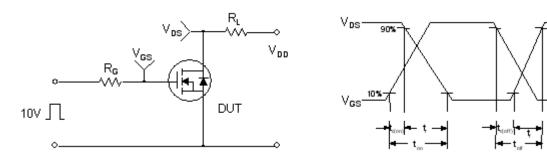
Figure 11. Transient Thermal Response Curve



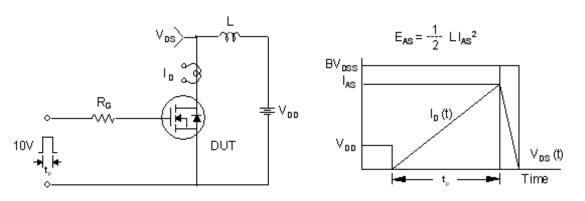
Gate Charge Test Circuit & Waveform



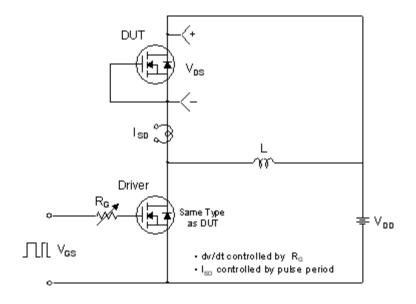
Resistive Switching Test Circuit & Waveforms

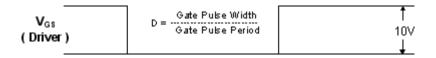


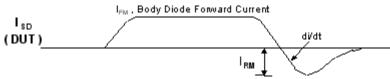
Unclamped Inductive Switching Test Circuit & Waveforms



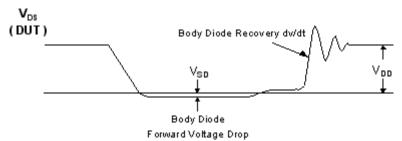
Peak Diode Recovery dv/dt Test Circuit & Waveforms





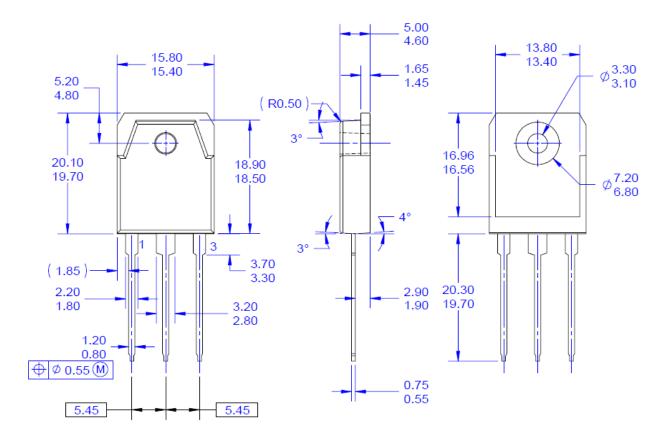


Body Diode Reverse Current



Mechanical Dimensions

TO-3PN





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