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October 2013

FDP16AN08A0

N-Channel PowerTrench[®] MOSFET 75 V, 58 A, 16 m Ω

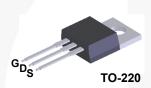
Features

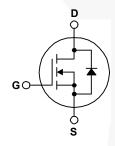
- $R_{DS(on)}$ = 13 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 58 A
- $Q_{G(tot)}$ = 28 nC (Typ.) @ V_{GS} = 10 V
- · Low Miller Charge
- · Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)

Formerly developmental type 82660

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- · Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	FDP16AN08A0	Unit
V _{DSS}	Drain to Source Voltage	75	V
V _{GS}	Gate to Source Voltage	±20	V
	Drain Current		
	Continuous ($T_C = 25^{\circ}C$, $V_{GS} = 10V$)	58	Α
I_D	Continuous (T _C = 100°C, V _{GS} = 10V)	44	
	Continuous ($T_{amb} = 25^{\circ}C$, $V_{GS} = 10V$, with $R_{\theta JA} = 43^{\circ}C/W$)		Α
	Pulsed	Figure 4	Α
E _{AS}	Single Pulse Avalanche Energy (Note 1)	117	mJ
	Power dissipation		W
P _D Derate above 25°C		0.9	W/°C
T _J , T _{STG}	Operating and Storage Temperature	-55 to 175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case, Max.	1.11	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Note 2), Max.	62	°C/W

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP16AN08A0	FDP16AN08A0	TO-220	Tube	N/A	50 units

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

Symbol	Parameter	Test Conditions	Mir	Тур	Max	Unit
Off Chara	cteristics			•	•	•
B _{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	75	-	-	V
1	Zoro Cata Voltago Drain Current	V _{DS} = 60V	-	-	1	
IDSS	Zero Gate Voltage Drain Current	$V_{GS} = 0V$ $T_C = 1$	50°C -	-	250	μΑ
I_{GSS}	Gate to Source Leakage Current	V _{GS} = ±20V	-	-	±100	nA

On Characteristics

V _{GS(TH)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	2	-	4	V
		I _D = 58A, V _{GS} = 10V	-	0.013	0.016	
		I _D = 29A, V _{GS} = 6V	-	0.019	0.029	0
	$I_D = 58A, V_{GS} = 10V,$ $T_J = 175^{\circ}C$	-	0.032	0.037	32	

Dynamic Characteristics

C _{ISS}	Input Capacitance	\/ - 25\/ \/	- 0)/	1	1857	-	pF
C _{OSS}	Output Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		-	288	-	pF
C _{RSS}	Reverse Transfer Capacitance	1 111112		1	88	-	pF
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V			28	42	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 2V	V _{DD} = 40V	ı	3.5	5	nC
	Gate to Source Gate Charge		I _D = 58A	ı	11	-	nC
$\frac{Q_gs}{Q_gs2}$	Gate Charge Threshold to Plateau		$I_g = 1.0 \text{mA}$	-	7.6	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	6.4	-	nC

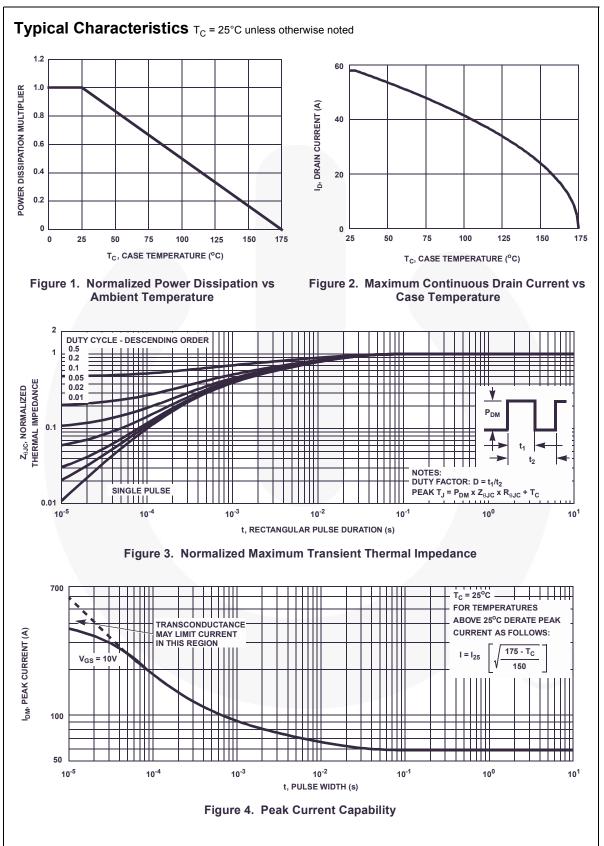
Switching Characteristics ($V_{GS} = 10V$)

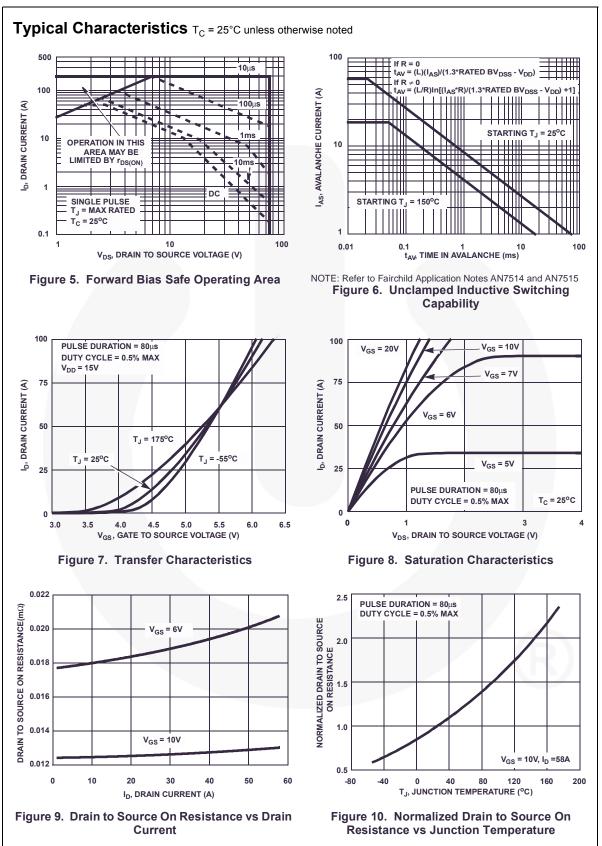
t _{ON}	Turn-On Time		-	-	135	ns
t _{d(ON)}	Turn-On Delay Time		-	8	-	ns
t _r	Rise Time	V _{DD} = 40V, I _D = 58A	-	82	-	ns
t _{d(OFF)}	Turn-Off Delay Time	$V_{GS} = 10V$, $R_{GS} = 10\Omega$	-	28	-	ns
t _f	Fall Time		-	30	/ -	ns
t _{OFF}	Turn-Off Time		-	- 4	86	ns

Drain-Source Diode Characteristics

V _{SD}	Source to Drain Diode Voltage	I _{SD} = 58A	-	-	1.25	V
		I _{SD} = 29A	-	-	1.0	V
t _{rr}	Reverse Recovery Time	$I_{SD} = 58A$, $dI_{SD}/dt = 100A/\mu s$	-	-	35	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 58A$, $dI_{SD}/dt = 100A/\mu s$	-	-	36	nC

Notes: 1: Starting $T_J = 25^{\circ}C$, $L = 260 \mu H$, $I_{AS} = 30 A$.





Typical Characteristics T_C = 25°C unless otherwise noted

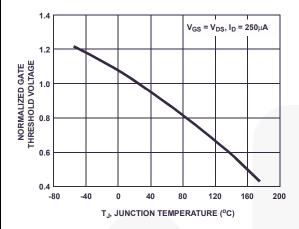


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

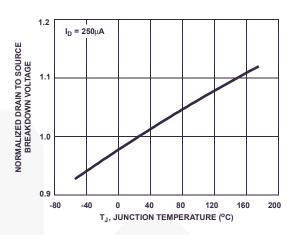


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

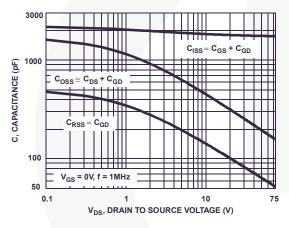


Figure 13. Capacitance vs Drain to Source Voltage

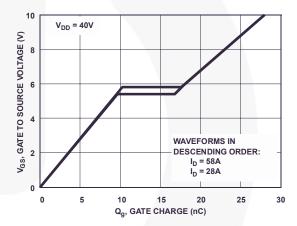


Figure 14. Gate Charge Waveforms for Constant Gate Current

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Test Circuits and Waveforms

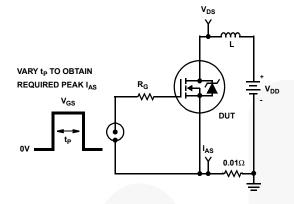


Figure 15. Unclamped Energy Test Circuit

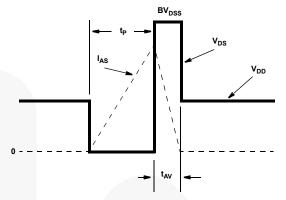


Figure 16. Unclamped Energy Waveforms

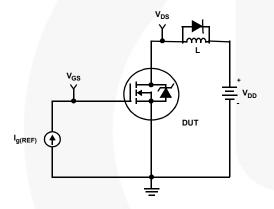


Figure 17. Gate Charge Test Circuit

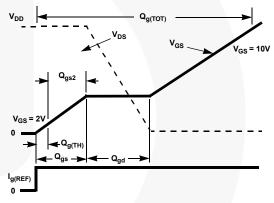


Figure 18. Gate Charge Waveforms

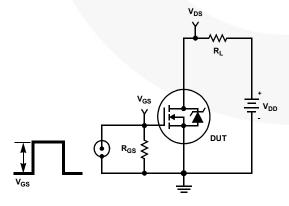


Figure 19. Switching Time Test Circuit

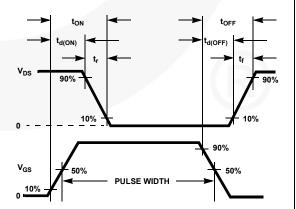
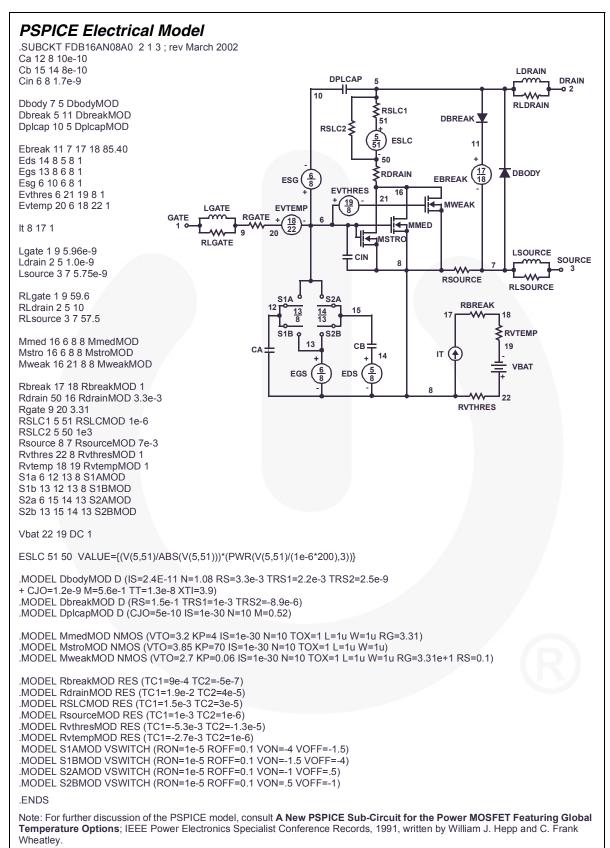


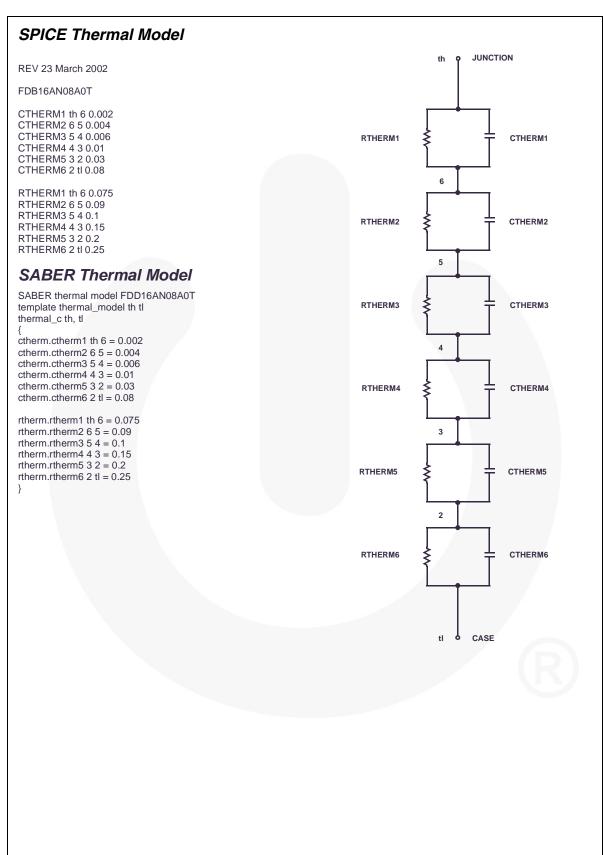
Figure 20. Switching Time Waveforms



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SABER Electrical Model rev March 2002 template FDB16AN08A0 n2,n1,n3 electrical n2,n1,n3 var i iscl dp..model dbodymod = (isl=2.4e-11,nl=1.08,rs=3.3e-3,trs1=2.2e-3,trs2=2.5e-9,cjo=1.2e-9,m=5.6e-1,tt=1.3e-8,xti=3.9) dp..model dbreakmod = (rs=1.5e-1,trs1=1e-3,trs2=-8.9e-6) dp..model dplcapmod = (cjo=5e-10,isl=10e-30,nl=10,m=0.52) m..model mmedmod = (type=_n,vto=3.2,kp=4,is=1e-30, tox=1) m..model mstrongmod = (type=_n,vto=3.85,kp=70,is=1e-30, tox=1) m..model mweakmod = (type=_n,vto=2.7,kp=0.06,is=1e-30, tox=1,rs=0.1) IDRAIN sw_vcsp..model s1amod = (ron=1e-5,roff=0.1,von=-4,voff=-1.5) DPLCAP DRAIN sw_vcsp..model s1bmod = (ron=1e-5,roff=0.1,von=-1.5,voff=-4) 10 sw_vcsp..model s2amod = (ron=1e-5,roff=0.1,von=-1,voff=.5) RLDRAIN sw_vcsp..model s2bmod = (ron=1e-5,roff=0.1,von=.5,voff=-1) ₹RSLC1 c.ca n12 n8 = 10e-1051 RSLC2 ₹ c.cb n15 n14 = 8e-10 ISCL c.cin n6 n8 = 1.7e-9**DBREAK** 50 dp.dbody n7 n5 = model=dbodymod RDRAIN dp.dbreak n5 n11 = model=dbreakmod 8 **ESG** dp.dplcap n10 n5 = model=dplcapmod DRODY **EVTHRES** 21 MWFAK spe.ebreak n11 n7 n17 n18 = 85.40 _{GATE} LGATE EVTEMP **RGATE** MMED spe.eds n14 n8 n5 n8 = 1 **EBREA** Ιg 20 spe.egs n13 n8 n6 n8 = 1 MSTR RLGATE spe.esg n6 n10 n6 n8 = 1 **LSOURCE** spe.evthres n6 n21 n19 n8 = 1CIN SOURCE spe.evtemp n20 n6 n18 n22 = 1 RSOURCE RLSOURCE i.it n8 n17 = 1**RBREAK** I.lgate n1 n9 = 5.96e-917 I.Idrain n2 n5 = 1.0e-9RVTEMP I.Isource n3 n7 = 5.75e-9CB 19 CA IT 14 res.rlgate n1 n9 = 59.6 **VBAT** res.rldrain n2 n5 = 10 EGS FDS res.rlsource n3 n7 = 57.5 m.mmed n16 n6 n8 n8 = model=mmedmod, l=1u, w=1u **RVTHRES** m.mstrong n16 n6 n8 n8 = model=mstrongmod, l=1u, w=1u m.mweak n16 n21 n8 n8 = model=mweakmod, l=1u, w=1u res.rbreak n17 n18 = 1, tc1=9e-4,tc2=-5e-7 res.rdrain n50 n16 = 3.3e-3, tc1=1.9e-2,tc2=4e-5 res.rgate n9 n20 = 3.31 res.rslc1 n5 n51 = 1e-6, tc1=1.5e-3,tc2=3e-5 res.rslc2 n5 n50 = 1e3 res.rsource n8 n7 = 7e-3, tc1=1e-3,tc2=1e-6 res.rvthres n22 n8 = 1, tc1=-5.3e-3,tc2=-1.3e-5 res.rvtemp n18 n19 = 1, tc1=-2.7e-3,tc2=1e-6 sw_vcsp.s1a n6 n12 n13 n8 = model=s1amod sw_vcsp.s1b n13 n12 n13 n8 = model=s1bmod sw_vcsp.s2a n6 n15 n14 n13 = model=s2amod sw_vcsp.s2b n13 n15 n14 n13 = model=s2bmod v.vbat n22 n19 = dc=1 equations { i (n51->n50) +=iscl iscl: v(n51,n50) = ((v(n5,n51)/(1e-9+abs(v(n5,n51))))*((abs(v(n5,n51)*1e6/200))**3))



Mechanical Dimensions

TO-220 3L

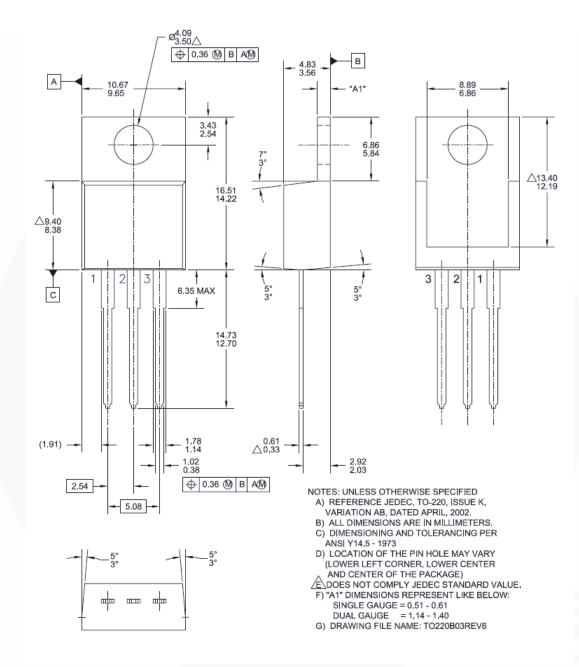


Figure 21. TO-220, Molded, 3Lead, Jedec Variation AB

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Dimension in Millimeters





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