April 2013

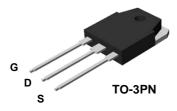


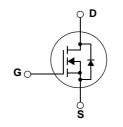
FQA13N50CF

N-Channel QFET[®] FRFET[®] MOSFET 500 V, 15 A, 48 m Ω

Features

- + 15 A, 500 V, $R_{DS(on)}$ = 48 m Ω (Max.) @ V_{GS} = 10 V, I_{D} = 7.5 A
- Low Gate Charge (Typ. 43 nC)
- Low C_{rss} (Typ. 20 pF)
- 100% Avalanche Tested
- Fast Recovery Body Diode (Typ. 100 ns)





(PFC), and electronic lamp ballasts.

This N-Channel enhancement mode power MOSFET is

produced using Fairchild Semiconductor®'s proprietary planar

stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state

resistance, and to provide superior switching performance and

high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction

Description

Absolute Maximum Ratings

Symbol	Parameter	FQA13N50CF	Unit	
V _{DSS}	Drain-Source Voltage	500	V	
I _D	Drain Current - Continuous ($T_C = 25^{\circ}C$)	15	А	
	- Continuous (T _C = 100°C)	9.5	А	
I _{DM}	Drain Current - Pulsed	(Note 1)	60	А
V _{GSS}	Gate-Source Voltage		± 30	V
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	860	mJ
I _{AR}	Avalanche Current	(Note 1)	15	А
E _{AR}	Repetitive Avalanche Energy	(Note 1)	21.8	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.5	V/ns
P _D	Power Dissipation ($T_C = 25^{\circ}C$)	218	W	
	- Derate above 25°C	1.56	W/°C	
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C	
TL	Maximum lead temperature for soldering purpose 1/8""from case for 5 seconds	300	°C	

Thermal Characteristics

Symbol	Parameter	FQA13N50CF	Unit	
$R_{ ext{ heta}JC}$	Thermal Resistance, Junction-to-Case, Max.	0.58	°C/W	
$R_{ hetaJS}$	Thermal Resistance, Case-to-Sink, Typ.	0.24	°C/W	
R_{\thetaJA}	Thermal Resistance, Junction-to-Ambient, Max.	40	°C/W	

Device Marking		Device	Packa	ge	Reel Size	Та	pe Wid	th	Quan	tity
		FQA13N50CF	TO-3P	N					30	
FQA13N			TO-3PI	N					30	
Electric	al Cha	racteristics T _c =	25°C unless othe	rwise noted						
Symbol		Parameter		Test Conditions		Min	Тур	Max	Unit	
Off Charac	teristics			+					ļ	
BV _{DSS}	Drain-So	urce Breakdown Voltage	•	V _{GS} = 0 \	/, I _D = 250 μA		500			V
ΔΒV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient		$I_D = 250 \ \mu$ A, Referenced to 25°C				0.5		V/°C	
° .		ate Voltage Drain Current		V _{DS} = 500 V, V _{GS} = 0 V				1	μA	
	-		$V_{DS} = 400 \text{ V}, \text{ T}_{C} = 125^{\circ}\text{C}$					10	μA	
I _{GSSF}	Gate-Boo	ly Leakage Current, For	ward	V _{GS} = 30	V, V _{DS} = 0 V				100	nA
I _{GSSR}	Gate-Boo	Gate-Body Leakage Current, Reverse		V_{GS} = -30 V, V_{DS} = 0 V				-100	nA	
On Charact	eristics									
V _{GS(th)}	Gate Thre	Threshold Voltage		$V_{DS}=V_{GS},\ I_{D}=250\ \mu A$		2.0		4.0	V	
R _{DS(on)}	Static Dra	ain-Source On-Resistance		$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 7.5 \text{ A}$				0.43	0.48	Ω
9fs	Forward	Transconductance	$V_{DS} = 40 \text{ V}, I_D = 7.5 \text{ A}$ (Note 4)				15		S	
Dynamic Ch	naracteristi	ics		1				1	T	1
C _{iss}	Input Cap	Capacitance		V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz				1580	2055	pF
C _{oss}	-	apacitance	1 = 1.0					180	235	pF
C _{rss}		Transfer Capacitance						20	25	pF
Switching C	haracteris	tics							1	T
t _{d(on)}	Turn-On	rn-On Delay Time		$V_{DD} = 250 \text{ V}, \text{ I}_{D} = 15\text{ A},$				25	60	ns
t _r	Turn-On	Rise Time		- R _G = 25 Ω (Note 4, 5)				100	210	ns
t _{d(off)}	Turn-Off	Delay Time					130	270	ns	
t _f	Turn-Off	Fall Time					100	210	ns	
Qg	Total Gate	e Charge		$V_{DS} = 400 \text{ V}, I_D = 15\text{A},$ $V_{GS} = 10 \text{ V}$			43	56	nC	
Q _{gs}	Gate-Sou	urce Charge					7.5		nC	
Q _{gd}	Gate-Dra	in Charge		(Note 4, 5)				18.5		nC
•	e Diode C	haracteristics and Maxi	num Ratings	<u> </u>					1	1
I _S	Maximum Continuous Drain-Source Diode Forward Current			ent				15	A	
I _{SM}	Maximum Pulsed Drain-Source Diode Forward								60	A
V _{SD}	Drain-So	urce Diode Forward Vol	age					1.4	V	
t _{rr}	Reverse	Recovery Time		$V_{GS} = 0$	[/] , I _S = 15 A,			100		ns
Q _{rr}	Reverse	Recovery Charge		$dI_{\rm F} / dt = 100 \text{ A}/\mu \text{s}$ (Note 4)			0.4		μC	

1. Repetitive Rating : Pulse width limited by maximum junction temperature

2. L = 5.6mH, I_{AS} =15A, V_{DD} = 50V, R_G = 25 $\Omega,$ Starting T_J = 25°C

3. $I_{SD} \leq$ 15A, di/dt \leq 200A/µs, $V_{DD} \leq BV_{DSS,}$ Starting $~T_{J}$ = 25°C

4. Pulse Test : Pulse width $\leq 300 \mu s,$ Duty cycle $\leq 2\%$

5. Essentially independent of operating temperature

Figure 1. On-Region Characteristics V_{GS} 15.0 V 10.0 V 8.0 V 7.0 V 6.0 V 10 5.5 V 5.0 V I_D, Drain Current [A] 4.5 V 10 Note 1. 250us Pulse Tes 2. T_c = 25°C 10 10 10 10 V_{DS}, Drain-Source Voltage [V] Figure 3. On-Resistance Variation vs. **Drain Current and Gate Voltage**

Typical Performance Characteristics

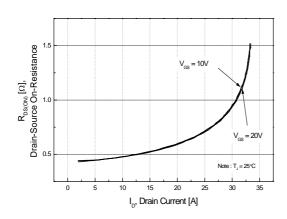


Figure 5. Capacitance Characteristics

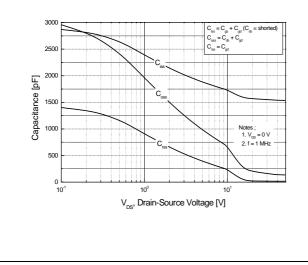
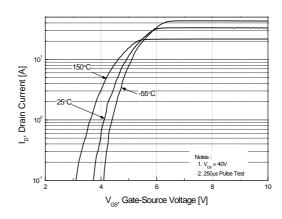
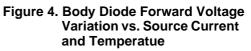


Figure 2. Transfer Characteristics





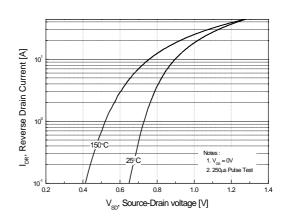
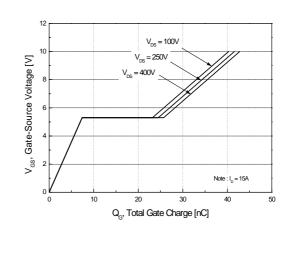
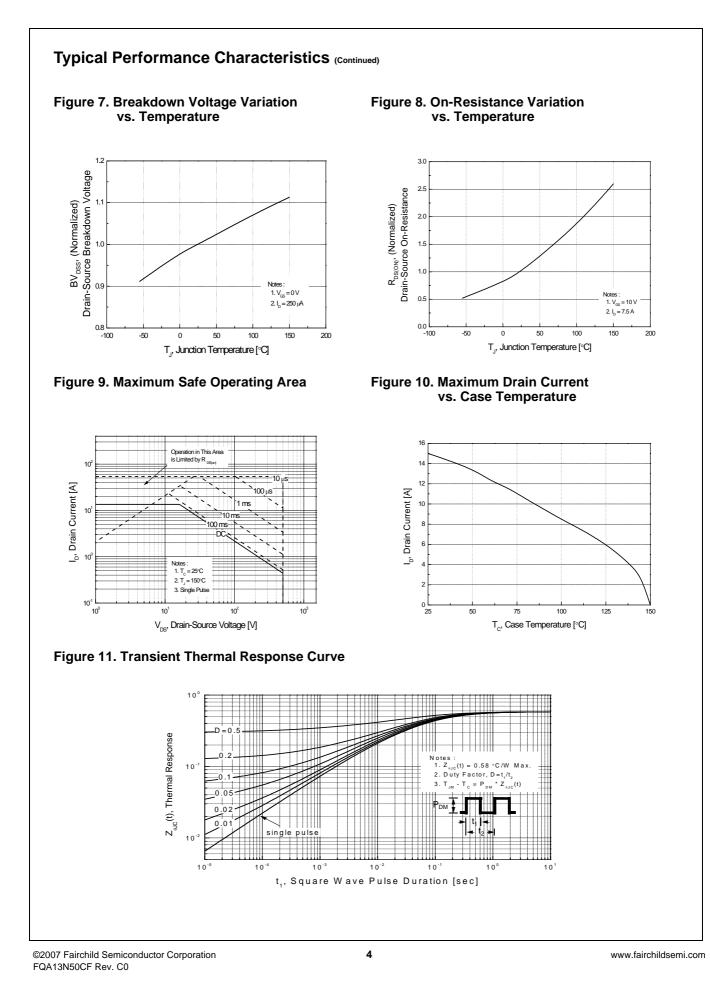
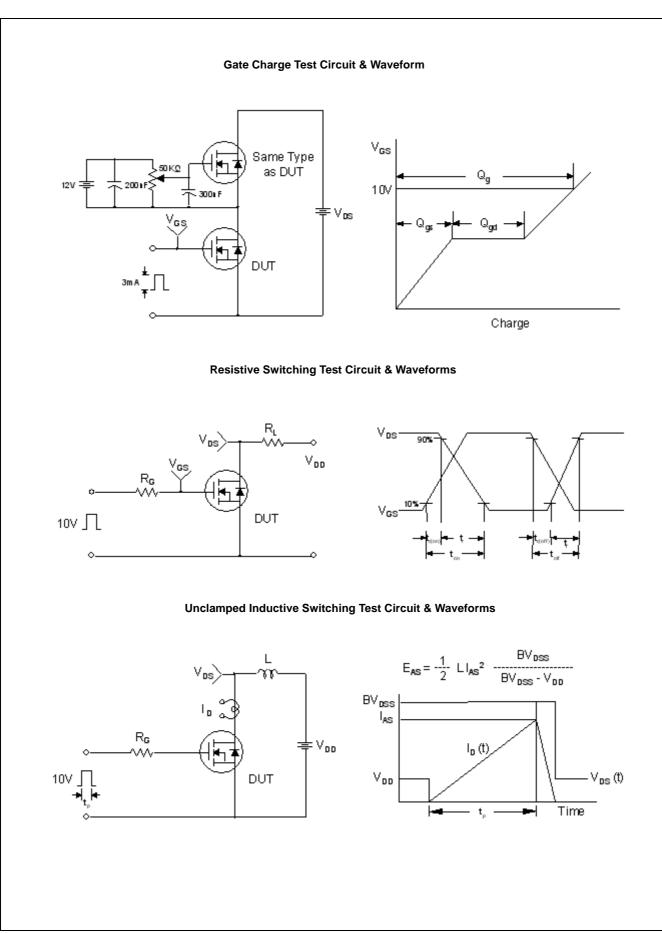


Figure 6. Gate Charge Characteristics

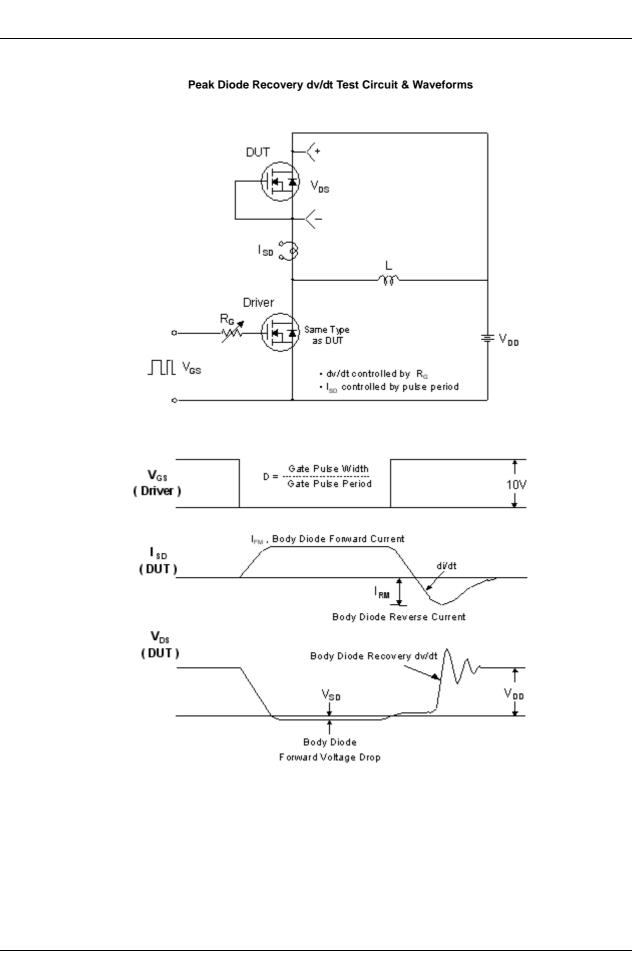


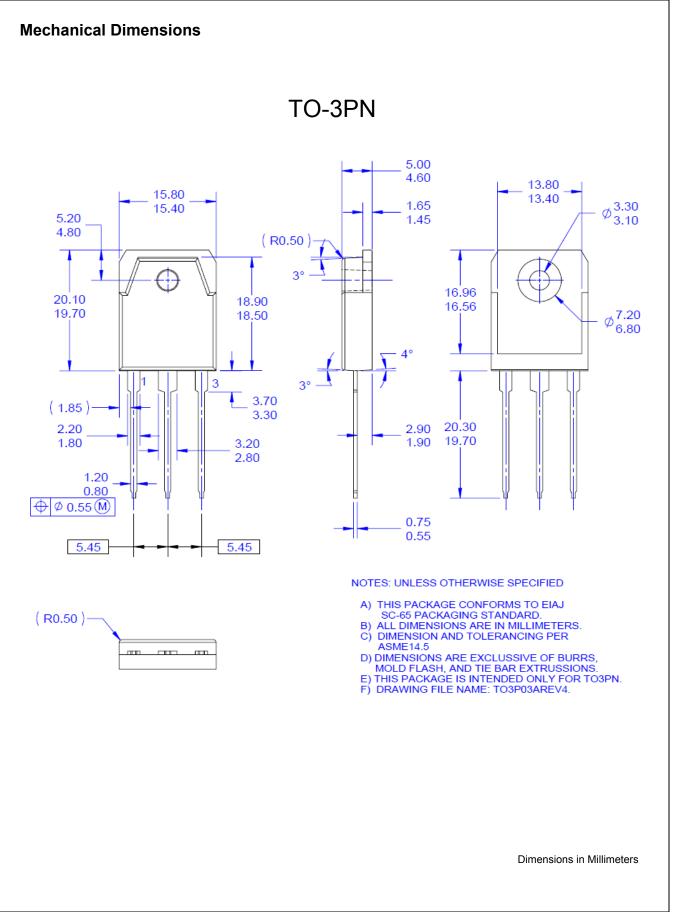
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