

October 2013

FQP45N15V2 / FQPF45N15V2

N-Channel QFET® MOSFET

150 V, 45 A, 40 mΩ

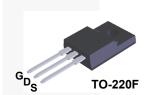
Description

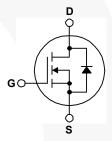
This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

Features

- 45 A, 150 V, R_{DS(on)} = 40 m Ω (Max.) @ V_{GS} = 10 V, I_D = 22.5 A
- Low Gate Charge (Typ. 72 nC)
- Low Crss (Typ. 135 pF)
- · 100% Avalanche Tested







Absolute Maximum Ratings T_c = 25°C unless otherwise noted.

Symbol	Parameter		FQP45N15V2	FQPF45N15V2	Unit
V_{DSS}	Drain-Source Voltage		150		V
I _D	Drain Current - Continuous (T _C = 25°	C)	45	45 *	Α
	- Continuous (T _C = 100°C)		31	31 *	Α
I _{DM}	Drain Current - Pulsed	(Note 1)	180	180 *	Α
V _{GSS}	Gate-Source Voltage		± 30		V
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	1124		mJ
I _{AR}	Avalanche Current	(Note 1)	45		Α
E _{AR}	Repetitive Avalanche Energy (Note		22		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.5		V/ns
P_D	Power Dissipation (T _C = 25°C)		220	66	W
	- Derate above 25°C	1.47	0.44	W/°C	
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150		°C
T _L	Maximum lead temperature for soldering 1/8" from case for 5 seconds	300		°C	

^{*} Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	FQP45N15V2	FQPF45N15V2	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.68	2.25	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink, Typ.	0.5		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	62.5	°C/W

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQP45N15V2	PV245N15	TO-220	Tube	N/A	N/A	50 units
FQPF45N15V2	FQPF45N15V2	TO-220F	Tube	N/A	N/A	50 units

Electrical Characteristics T_C = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Off Cha	aracteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	150			V
ΔBV_{DSS} / ΔT_{J}	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		0.21		V/°C
I _{DSS} Zero Gate Voltage	Zana Cata Valta na Duain Commant	$V_{DS} = 150 \text{ V}, V_{GS} = 0 \text{ V}$			1	μΑ
	Zero Gate Voltage Drain Current	V _{DS} = 120 V, T _C = 150°C			10	μΑ
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V			100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V			-100	nA
On Cha	aracteristics					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	2.0		4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 22.5 A		0.034	0.04	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 22.5 A		40		S
Dynam	ic Characteristics					
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz		2330	3030	pF
Coss	Output Capacitance			510	670	pF
C _{rss}	Reverse Transfer Capacitance			135	176	pF
Switch	ing Characteristics					
t _{d(on)}	Turn-On Delay Time	V _{DD} = 75 V, I _D = 45 A,		22	54	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$		232	474	ns
t _{d(off)}	Turn-Off Delay Time			224	458	ns
t _f	Turn-Off Fall Time	(Note 4)		246	502	ns
Qg	Total Gate Charge	V _{DS} = 120 V, I _D = 45 A,		72	94	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 10 V (Note 4)		13		nC
Q _{gd}	Gate-Drain Charge			31		nC
Drain-S	Source Diode Characteristics ar	nd Maximum Ratings				
Drain-S	Source Diode Characteristics at Maximum Continuous Drain-Source Dio				45	Α

Q_{rr}

 V_{SD}

 t_{rr}

Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. L = 0.74 mH, I_{AS} = 45 A, V_{DD} = 50 V, R_G = 25 Ω . Starting T_J = 25°C 3. I_{SD} ≤ 45 A, di/dt ≤ 200 A/ μ s, V_{DD} ≤ BV $_{DSS}$, Starting T_J = 25°C 4. Essentially independent of operating temperature

Drain-Source Diode Forward Voltage

Reverse Recovery Time

Reverse Recovery Charge

1.4

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176

1.19

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ns

μС

 $V_{GS} = 0 \text{ V, } I_{S} = 45 \text{ A}$

 $V_{GS} = 0 \text{ V, } I_{S} = 45 \text{ A,}$

 $dI_F / dt = 100 A/\mu s$

Typical Characteristics

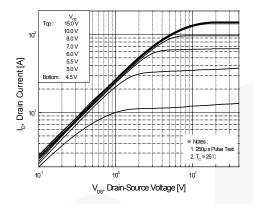


Figure 1. On-Region Characteristics

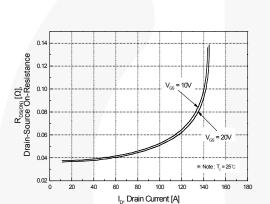


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

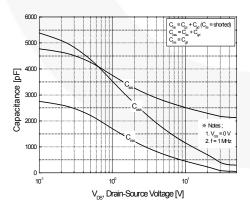


Figure 5. Capacitance Characteristics

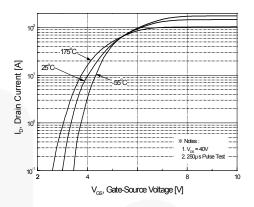


Figure 2. Transfer Characteristics

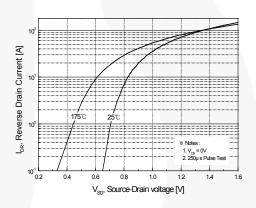


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

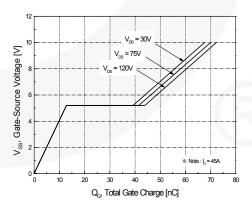


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

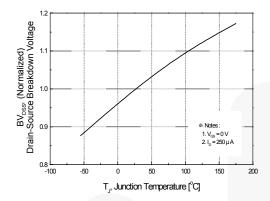


Figure 7. Breakdown Voltage Variation vs Temperature

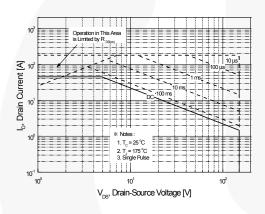


Figure 9-1. Maximum Safe Operating Area for FQP45N15V2

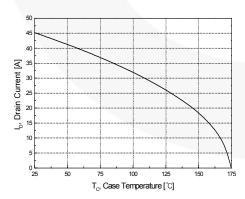


Figure 10. Maximum Drain Current vs Case Temperature

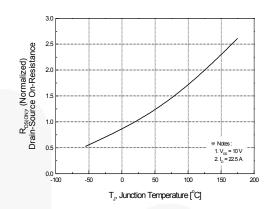


Figure 8. On-Resistance Variation vs Temperature

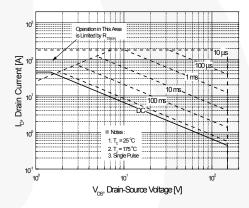


Figure 9-2. Maximum Safe Operating Area for FQPF45N15V2

Typical Characteristics (Continued)

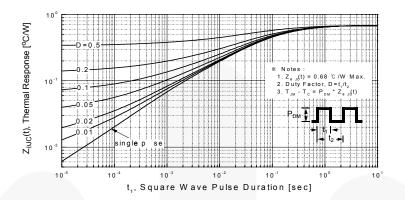


Figure 11. Transient Thermal Response Curve for FQP45N15V2

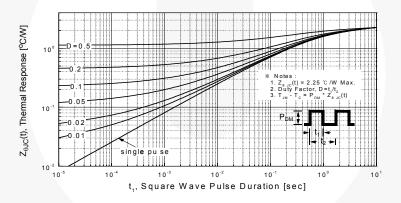


Figure 11-2. Transient Thermal Response Curve for FQPF45N15V2

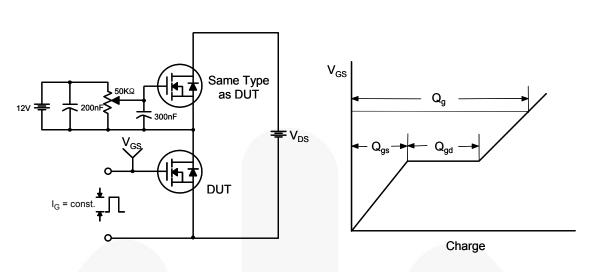


Figure 12. Gate Charge Test Circuit & Waveform

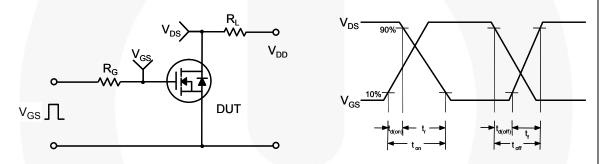


Figure 13. Resistive Switching Test Circuit & Waveforms

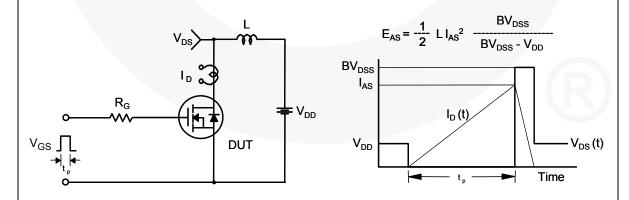
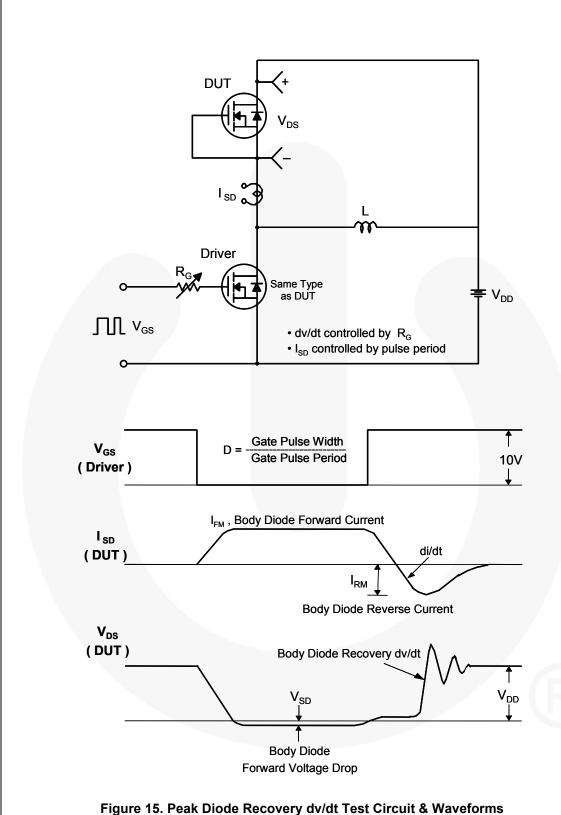


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions

TO-220 3L

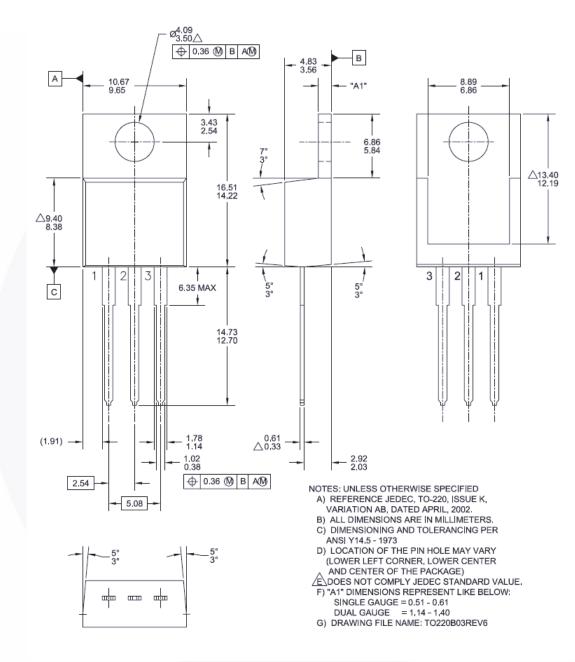


Figure 16. TO-220, Molded, 3Lead, Jedec Variation AB

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Dimension in Millimeters

Mechanical Dimensions

TO-220F 3L

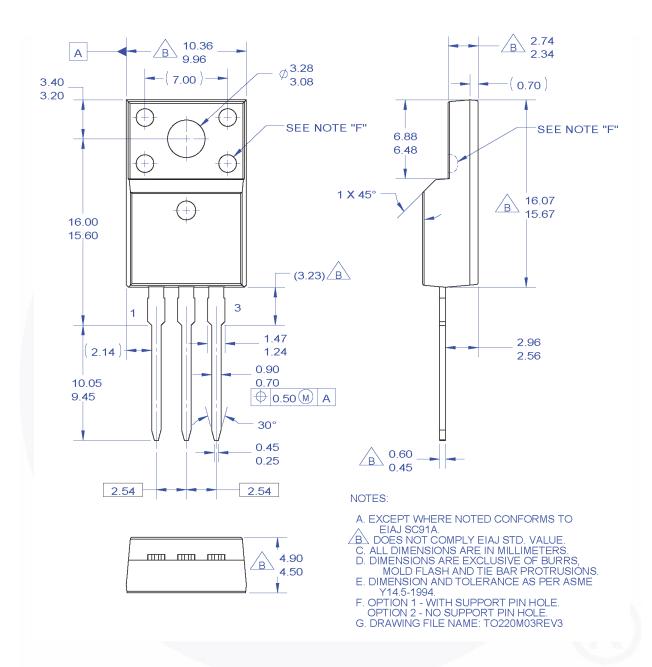


Figure 17. TO220, Molded, 3LD, Full Pack, EIAJ SC91, Straight Lead

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Dimension in Millimeters





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