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November 2013



# FQB5N50C

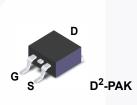
# N-Channel QFET<sup>®</sup> MOSFET 500 V, 5 A, 1.4 $\Omega$

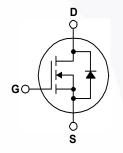
### Features

- + 5 A, 500 V,  $R_{DS(on)}$  = 1.4  $\Omega$  (Max.) @ V<sub>GS</sub> = 10 V, I<sub>D</sub> = 2.5 A
- Low Gate Charge (Typ. 18 nC)
- Low Crss (Typ. 15 pF)
- 100% Avalanche Tested
- RoHS Compliant

### 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, active power factor correction (PFC), and electronic lamp ballasts.





## Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted.

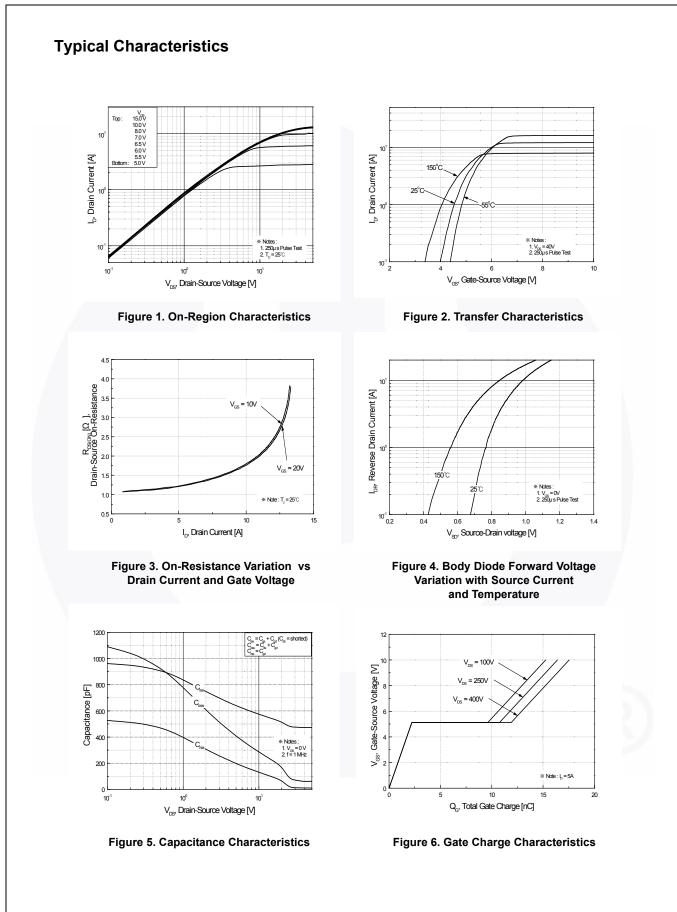
Symbol	Parameter		FQB5N50CTM	Unit	
V <sub>DSS</sub>	Drain-Source Voltage		500	V	
I <sub>D</sub>	Drain Current - Continuous (T <sub>C</sub> = 25°C)		5	А	
	- Continuous (T <sub>C</sub> = 100°C)		2.9	А	
I <sub>DM</sub>	Drain Current - Pulsed	(Note 1)	20	А	
V <sub>GSS</sub>	Gate-Source Voltage		± 30	V	
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)		300	mJ	
I <sub>AR</sub>	Avalanche Current	(Note 1)	5	A	
E <sub>AR</sub>	Repetitive Avalanche Energy (Note		7.3	mJ	
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.5	V/ns	
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> = 25°C)		73	W	
	- Derate above 25°C		0.58	W/°C	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range		-55 to +150	°C	
TL	Maximum lead temperature for soldering purposes,1/8" from case for 5 seconds		300	°C	
			500		

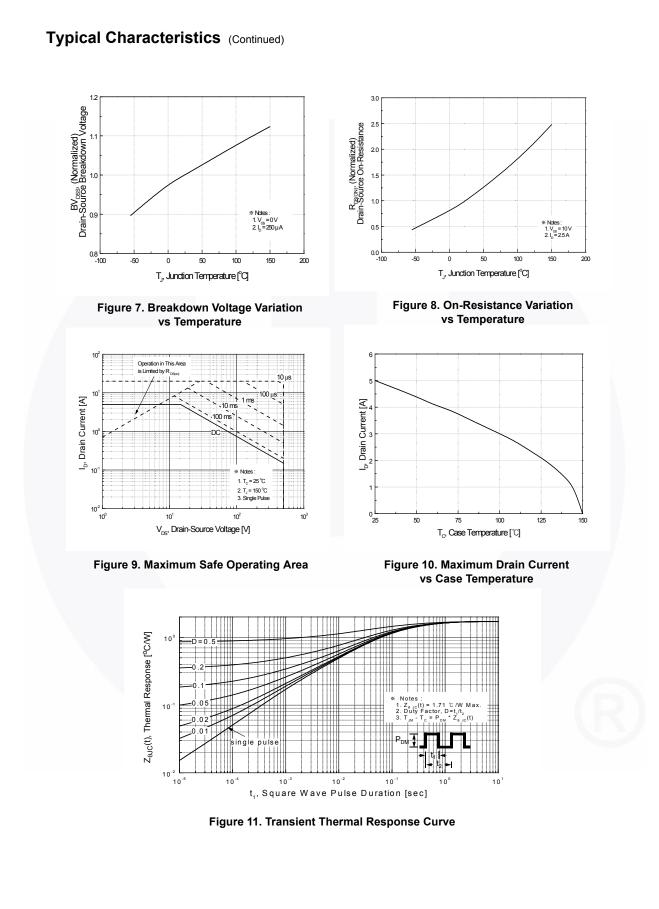
## **Thermal Characteristics**

Symbol	Parameter	Parameter FQB5N50CTM		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	1.71	°C/W	
$R_{ extsf{ heta}JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	C/VV	

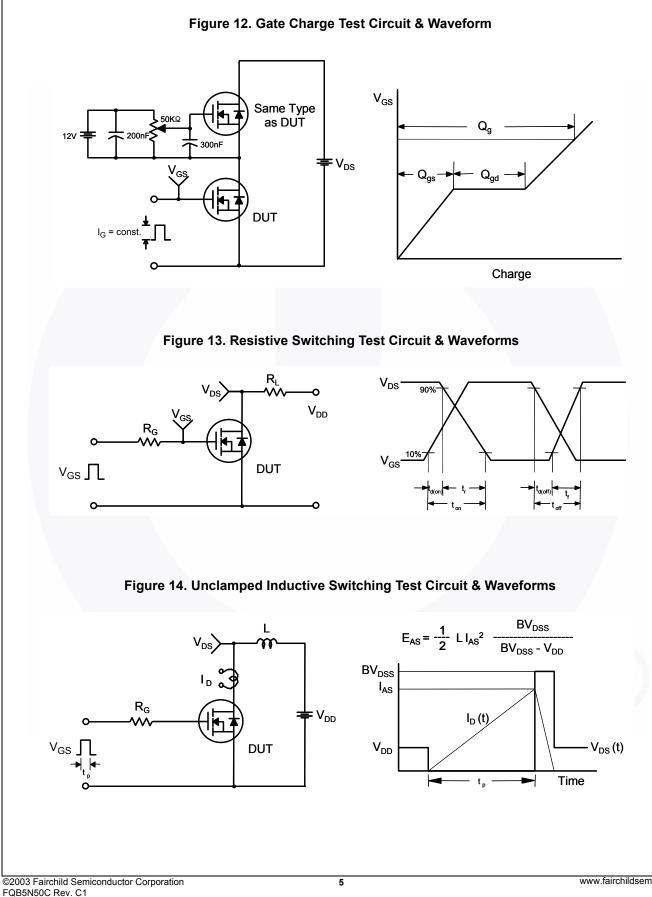
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	5N50C							antity
lectric		Device MarkingDeviceFQB5N50CFQB5N50CTM		330 mm	24 mm		800	units
	al Char	acteristics T <sub>c</sub> = 25°C	c unless otherwise	noted.				
Symbol		Parameter	Test C	onditions	Min	Тур	Max	Unit
Off Cha	racteristi	~e						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage		V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA		500			V
ΔBV <sub>DSS</sub> ΔT,I	Breakdown Voltage Temperature		$I_D = 250 \ \mu\text{A}$ , Referenced to 25°C			0.5		V/°C
0			V <sub>DS</sub> = 500 V, V <sub>GS</sub> = 0 V				1	μA
DSS	Zero Gate	/oltage Drain Current	$V_{DS} = 400 \text{ V}, \text{ T}_{C} = 125^{\circ}\text{C}$				10	μA
GSSF	Gate-Body	Leakage Current, Forward	$V_{GS}$ = 30 V, $V_{DS}$	= 0 V			100	nA
GSSR	Gate-Body	Leakage Current, Reverse	$V_{GS}$ = -30 V, $V_{DS}$	s = 0 V			-100	nA
On Cha	racteristic	s						
/ <sub>GS(th)</sub>	Gate Thres	hold Voltage	$V_{DS} = V_{GS}, I_D = 1$	250 μΑ	2.0		4.0	V
R <sub>DS(on)</sub>	Static Drain On-Resista		$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 2.5 \text{ A}$			1.14	1.4	Ω
FS	Forward Tra	ansconductance	$V_{DS}$ = 40 V, $I_{D}$ =	2.5A		5.2		S
Dynami	c Charact	eristics						
Siss	Input Capao	citance	V <sub>DS</sub> = 25 V, V <sub>GS</sub>	= 0 V,		480	625	pF
Coss	Output Cap	acitance	f = 1.0 MHz			80	105	pF
Srss	Reverse Tra	ansfer Capacitance				15	20	pF
Switchi	ng Charao	cteristics						
d(on)	Turn-On De	elay Time	$V_{DD}$ = 250 V, I <sub>D</sub> = 5A, R <sub>G</sub> = 25 Ω (Note 4)			12	35	ns
r	Turn-On Ris	se Time				46	100	ns
d(off)	Turn-Off De	lay Time				50	110	ns
F	Turn-Off Fa	ll Time				48	105	ns
λ <sup>g</sup>	Total Gate	Charge	$V_{DS}$ = 400 V, I_D = 5A, $V_{GS}$ = 10 V (Note 4)		/	18	24	nC
λ <sub>gs</sub>	Gate-Sourc	e Charge				2.2		nC
Q <sub>gd</sub>	Gate-Drain	Charge				9.7		nC
Drain-Se	ource Dio	de Characteristics a	nd Maximum F	Ratings				
s		Continuous Drain-Source Dic		•			5	Α
SM	Maximum F	Pulsed Drain-Source Diode F					20	Α
/ <sub>SD</sub>	Drain-Source	e Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 5	A			1.4	V
rr		ecovery Time	$V_{GS} = 0 V, I_{S} = 5$			263		ns
ک <sup>رر</sup>	Reverse Re	ecovery Charge	dI <sub>F</sub> / dt = 100 A/µ			1.9		μC
TES:								
	ating : Pulse widt	n limited by maximum junction tempe	rature.					





FQB5N50C — N-Channel QFET<sup>®</sup> MOSFET



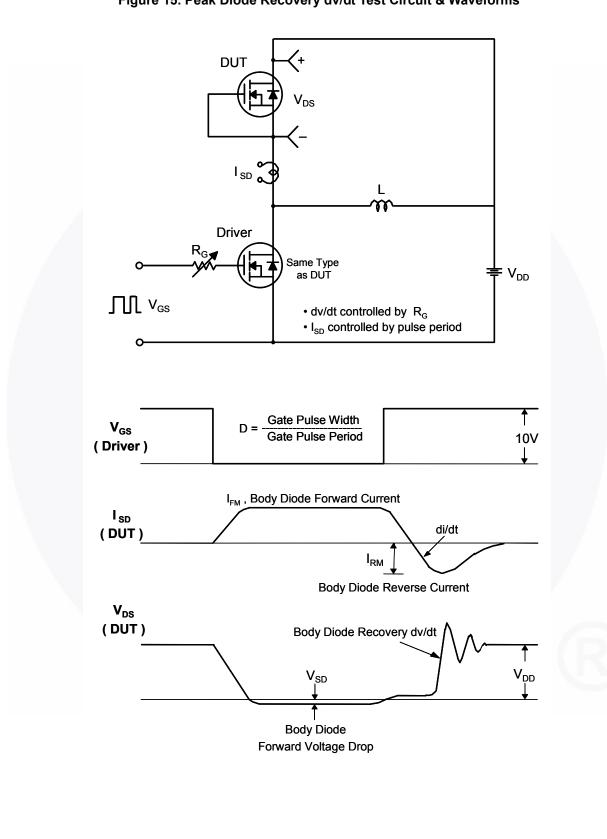
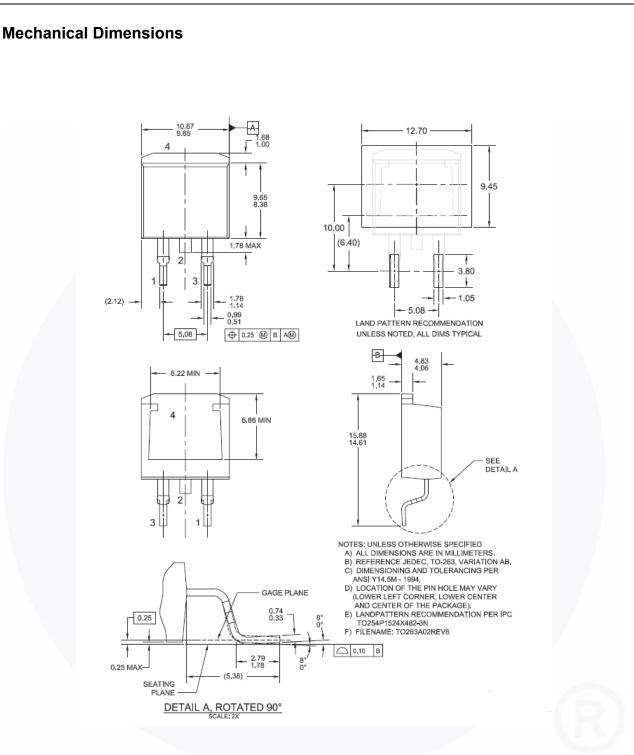


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



## Figure 16. TO263 (D<sup>2</sup>PAK), Molded, 2-Lead, Surface Mount

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FQB5N50C — N-Channel QFET<sup>®</sup> MOSFET



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DEUXPEED®	ISOPLANAR™	→ TM	TinyPower™
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