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FQB10N50CF N-Channel QFET[®] FRFET[®] MOSFET 500 V, 10 A, 610 m Ω

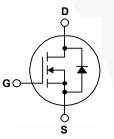
Features

- 10 A, 500 V, $R_{DS(on)}$ = 610 m Ω (Max.) @ V_{GS} = 10 V, I_D = 5 A
- Low gate charge (Typ. 45 nC)
- Low Crss (Typ. 17.5 pF)
- 100% avalanche tested
- · Fast recovery body diode

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.





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter			FQB10N50CFTM_WS	Unit
V _{DSS}	Drain to Source Voltage			500	V
V _{GSS}	Gate to Source Voltage			±30	V
ID	Drain Current	- Continuous (T _C = 25 ^o C)		10	
	DrainCurrent	- Continuous ($T_C = 100^{\circ}C$)	- Continuous ($T_C = 100^{\circ}C$)		A
I _{DM}	Drain Current	- Pulsed	- Pulsed (Note 1)		А
E _{AS}	Single Pulsed Avalanche Energy (Note			825	mJ
I _{AR}	Avalanche Current		(Note 1)	10	А
E _{AR}	Repetitive Avalanche Energy		(Note 1)	14.3	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	2.0	V/ns
P _D	Dower Dissinction	(T _C = 25°C)		143	W
	Power Dissipation	- Derate above 25°C		1.14	W/ºC
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	FQB10N50CFTM_WS	Unit
$R_{ ext{ heta}JC}$	Thermal Resistance, Junction to Case, Max	0.87	
D	Thermal Resistance, Junction to Ambient (minimum pad of 2 oz copper), Max.	62.5	°C/W
$R_{ extsf{ heta}JA}$	Thermal Resistance, Junction to Ambient (1 in ² pad of 2 oz copper), Max.	40	

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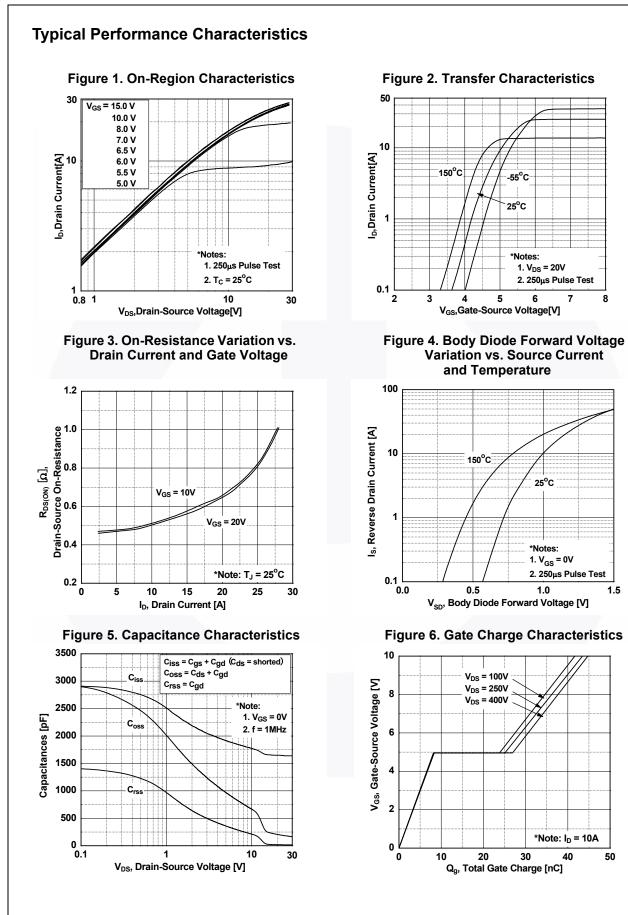
October 2013

rking	Device	Package	Reel Size	Tape Wid	th	Quant	tity
FQB10N50CF FQB10N50CFTM_W		D2-PAK	330mm	24mm		800	
I Cha	racteristics						
	Parameter		Test Conditions		Тур.	Max.	Unit
teristic	s						
Drain t	o Source Breakdown Voltage	I _D = 250μ	A, V _{GS} = 0V, T _J = 25 ^o C	500	-	-	V
		_	$I_D = 250\mu$ A, Referenced to 25° C		0.5	-	V/°C
Zero G	ate Voltage Drain Current			-	-	10	μA
2010 0	ate voltage Brain Current		-	-	-	100	μ
Gate to	Body Leakage Current	t $V_{GS} = \pm 30V, V_{DS} = 0V$		-	-	±100	nA
teristic	S						
Gate T	hreshold Voltage	V _{GS} = V _D	_S , I _D = 250μA	2.0	-	4.0	V
Static I	Drain to Source On Resistance	V _{GS} = 10	V, I _D = 5A	-	0.51	0.61	Ω
Forwar	rd Transconductance	V _{DS} = 20	$V_{DS} = 20V, I_D = 5A$		105	-	S
haract	eristics	· · ·					
-	put Capacitance		-	1660	2210	pF	
			V _{DS} = 25V, V _{GS} = 0V f = 1MHz				pF
		f = 1MHz			17.5	26	pF
					45	60	nC
			$V_{DS} = 400V, I_D = 10A$ $V_{GS} = 10V$ (Note 4)		8	-	nC
Gate to	Drain "Miller" Charge	V _{GS} = 10			19	-	nC
Charac	storistics	l		· .			
				_	25	60	ns
	,	V _{DD} = 25	0V, I _D = 10A				ns
			$R_{G} = 25\Omega$				ns
	· ·		(Note -	4) -	55	120	ns
ce Dio	de Characteristics						
				-	-	10	А
Maximu	um Pulsed Drain to Source Diode	e Forward Curre	Forward Current		-	40	Α
				-	-	1.4	V
Revers	e Recovery Time		$V_{GS} = 0V, I_{SD} = 10A$ $V_{GS} = 0V, I_{SD} = 10A$ $dI_F/dt = 100A/\mu s$		91	-	ns
Revers	e Recovery Charge				220	-	nC
	I Chai teristic Drain t Breakc Coeffic Zero G Gate to teristic Gate T Static I Forwar Charact Gate to Gate to Gate to Gate to Gate to Charac Turn-O	I Characteristics Parameter teristics Drain to Source Breakdown Voltage Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current Gate to Body Leakage Current teristics Gate Threshold Voltage Static Drain to Source On Resistance Forward Transconductance Eharacteristics Input Capacitance Output Capacitance Reverse Transfer Capacitance Total Gate Charge at 10V Gate to Source Gate Charge Gate to Drain "Miller" Charge Characteristics Turn-On Delay Time Turn-On Rise Time Turn-Off Fall Time Turn-Off Fall Time Ce Diode Characteristics Maximum Continuous Drain to Source Diode Drain to Source Diode Forward Voltage	I Characteristics Parameter teristics Drain to Source Breakdown Voltage $I_D = 250 \mu$ Breakdown Voltage Temperature Coefficient $I_D = 250 \mu$ Zero Gate Voltage Drain Current $V_{DS} = 500$ Gate to Body Leakage Current $V_{GS} = \pm 30$ teristics Gate Threshold Voltage $V_{GS} = V_D$ Static Drain to Source On Resistance $V_{GS} = 10$ Forward Transconductance $V_{DS} = 20$ tharacteristics Input Capacitance $V_{DS} = 20$ Output Capacitance $V_{DS} = 25$ Gate to Source Gate Charge $V_{DS} = 10$ Gate to Drain "Miller" Charge $V_{DS} = 400$ Gate to Drain "Miller" Charge $V_{DS} = 10$ Characteristics $Turn-On Rise Time$ $V_{DD} = 250$ Turn-On Rise Time $V_{DD} = 250$ $R_G = 250$ Turn-Off Fall Time $V_{DD} = 250$ <	I Characteristics Parameter Test Conditions teristics Ip = 250 μ A, V _{GS} = 0V, T _J = 25°C Breakdown Voltage Temperature Coefficient Ip = 250 μ A, Referenced to 25°C Zero Gate Voltage Drain Current V _{DS} = 500V, V _{GS} = 0V Zero Gate Voltage Drain Current V _{DS} = 500V, V _{GS} = 0V Gate to Body Leakage Current V _{GS} = ±30V, V _{DS} = 0V Gate Threshold Voltage V _{GS} = ±30V, V _{DS} = 0V Gate Threshold Voltage V _{GS} = 10V, Ip = 5A Forward Transconductance V _{DS} = 25V, V _{GS} = 0V Paracteristics V_DS = 25V, V _{GS} = 0V Input Capacitance V_DS = 25V, V _{GS} = 0V Output Capacitance V_DS = 25V, V _{GS} = 0V Test Conductance V_DS = 25V, V _{GS} = 0V Gate to Source Gate Charge V_DS = 400V, Ip = 10A Gate to Drain "Miller" Charge V _{DS} = 250V, Ip = 10A Characteristics VDS = 250V, Ip = 10A Turn-On Blay Time V _{DD} = 250V, Ip = 10A Turn-Off Delay Time V _{DD} = 250V, Ip = 10A Turn-Off Fall Time V _{DD} = 250V, Ip = 10A Turn-Off Fall Time V _{DS} = 250 In = 10A Turn-Off belay Time V _{DS} =	I CharacteristicsParameterTest ConditionsMin.teristicsDrain to Source Breakdown Voltage $I_D = 250\mu A$, $V_{GS} = 0V$, $T_J = 25^{\circ}C$ 500Breakdown Voltage Temperature Coefficient $I_D = 250\mu A$, Referenced to $25^{\circ}C$ -Zero Gate Voltage Drain Current $\frac{V_{DS} = 500V$, $V_{GS} = 0V$ -Gate to Body Leakage Current $V_{GS} = 400V$, $T_C = 125^{\circ}C$ -Gate to Body Leakage Current $V_{GS} = 400V$, $T_C = 125^{\circ}C$ -Gate Threshold Voltage $V_{GS} = 10V$, $I_D = 5A$ -Gate Transconductance $V_{OS} = 20V$, $I_D = 5A$ -Forward Transconductance $V_{DS} = 20V$, $I_D = 5A$ -Output Capacitance $V_{DS} = 25V$, $V_{GS} = 0V$ -Input Capacitance $V_{DS} = 25V$, $V_{GS} = 0V$ -Output Capacitance $V_{CS} = 10H_Z$ -Total Gate Charge at $10V$ $V_{SS} = 400V$, $I_D = 10A$ -Gate to Drain "Miller" Charge $V_{CS} = 10V$ -CharacteristicsTurn-On Elay TimeTurn-Off Elal Time $V_{DD} = 250V$, $I_D = 10A$ -Turn-Off Fall Time(Note 4)-Ce Diode Characteristics-Maximum Continuous Drain to Source Diode Forward Current-Maximum Cubindous Drain to Source Diode Forward Current-Drain to Source Diode Forward Voltage $V_{GS} = 0V$, $I_{SD} = 10A$ -	I CharacteristicsParameterTest ConditionsMin.Typ.teristicsDrain to Source Breakdown Voltage $I_D = 250\mu$ A, $V_{GS} = 0V$, $T_J = 25^{\circ}$ C500-Breakdown Voltage Temperature $I_D = 250\mu$ A, Referenced to 25° C-0.5Zero Gate Voltage Drain Current $V_{DS} = 500V$, $V_{GS} = 0V$ Gate to Body Leakage Current $V_{GS} = 125^{\circ}$ CGate to Body Leakage Current $V_{GS} = 10V$, $V_{DS} = 0V$ teristicsStatic Drain to Source On Resistance $V_{GS} = 10V$, $I_D = 5A$ 2.0-Gate Threshold Voltage $V_{GS} = 10V$, $I_D = 5A$ -0.51Forward Transconductance $V_{DS} = 25V$, $V_{GS} = 0V$ -105HaracteristicsStatic Drain to Source On Resistance $V_{DS} = 25V$, $V_{GS} = 0V$ -1660Output Capacitance $V_{DS} = 25V$, $V_{GS} = 0V$ -182-Iput Capacitance $V_{DS} = 25V$, $V_{GS} = 10A$ -1660Output Capacitance $V_{DS} = 400V$, $I_D = 10A$ -38Gate to Drain "Miller" Charge $V_{DS} = 250V$, $I_D = 10A$ -38Gate to Drain "Miller" Charge $V_{DD} = 250V$, $I_D = 10A$ -25Centrestics138Turn-Oft Delay Time-25Turn-Oft Pelay Time-25Centre Colde CharacteristicsMaximum Continuous Drain to Source Diode Forward CurrentMaximum Pulsed Drai	I CharacteristicsParameterTest ConditionsMin.Typ.Max.teristicsDrain to Source Breakdown Voltage $I_p = 250 \mu A$, $V_{GS} = 0V$, $T_J = 25^{\circ}C$ 500Breakdown Voltage Temperature $I_p = 250 \mu A$, Referenced to $25^{\circ}C$ 0.5Coefficient $V_{DS} = 500V$, $V_{GS} = 0V$ -10Zero Gate Voltage Drain Current $V_{DS} = 500V$, $V_{GS} = 0V$ 100Gate to Body Leakage Current $V_{GS} = \pm 30V$, $V_{DS} = 0V$ -+100teristicsGate Threshold Voltage $V_{GS} = V_{DS}$, $I_D = 250 \mu A$ 2.0-4.0Static Drain to Source On Resistance $V_{GS} = 10V$, $I_D = 5A$ -0.510.61Forward Transconductance $V_{DS} = 25V$, $V_{CS} = 0V$ -182240NuracteristicsInput Capacitance T_{TM} 4560Cate to Drain "Miller" Charge $V_{DS} = 400V$, $I_D = 10A$ -4560Cate to Drain "Miller" Charge $V_{DD} = 250V$, $I_D = 10A$ -2560Turn-On Delay Time $V_{DD} = 250V$, $I_D = 10A$ -2560Turn-Off Delay Time $V_{CS} = 25V$, $I_D = 10A$ -138285Turn-Off Fall Time $V_{OD} = 250V$, $I_D = 10A$ -2560Characteristics10Maximum Continuous Drain to Source Diode Forward Current10Maximum Continuous Drain to Source Diode Forward Current </td

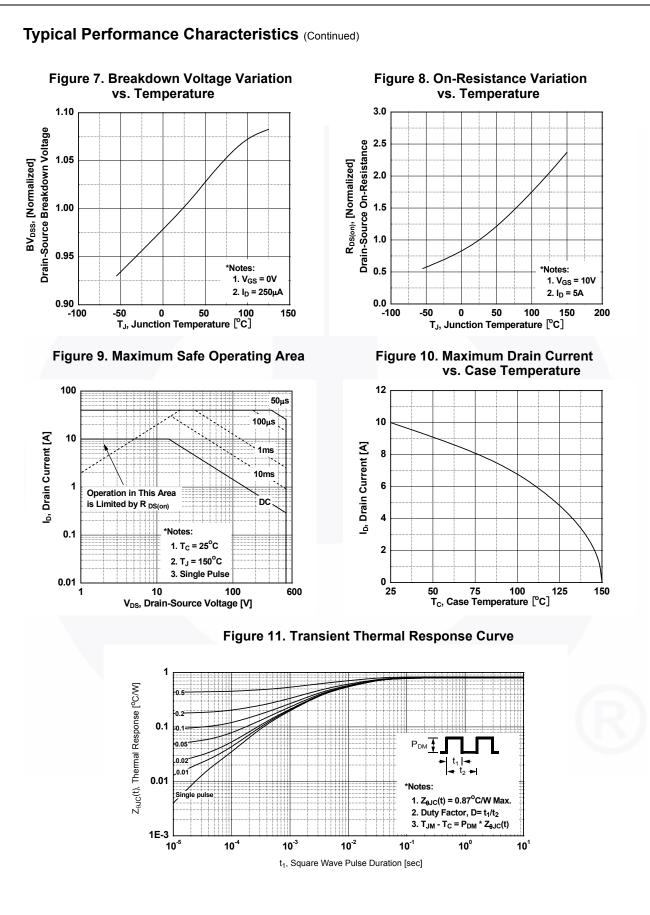
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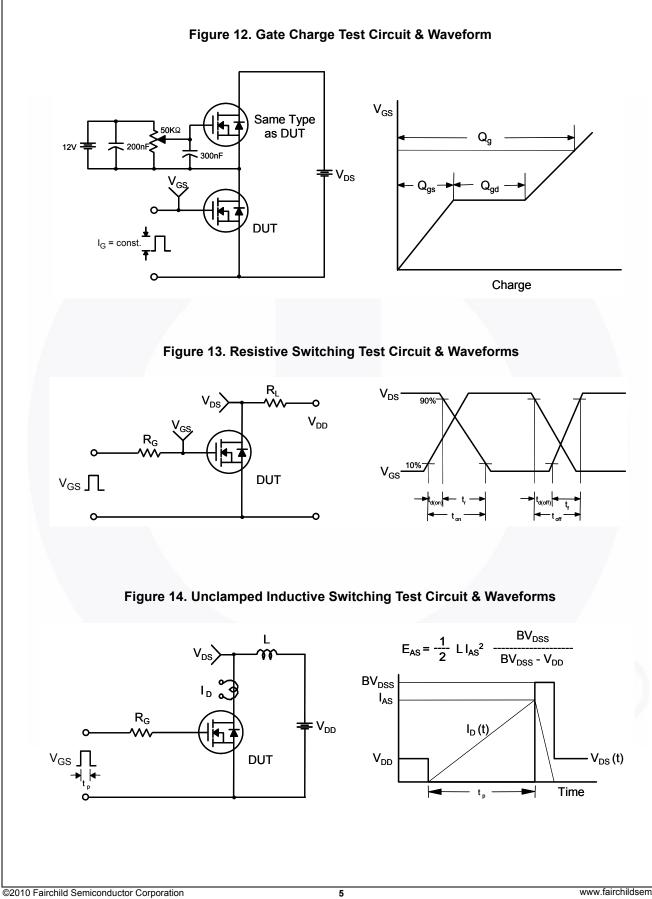




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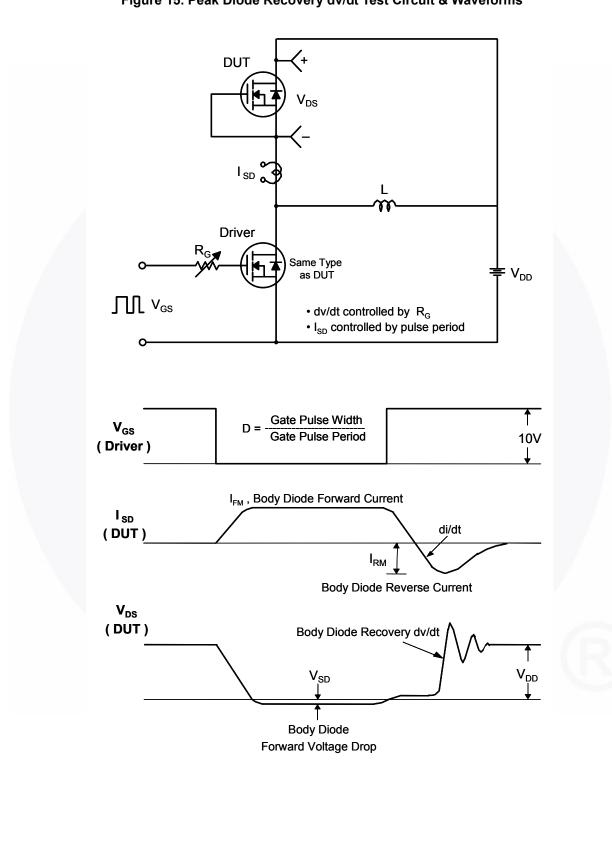
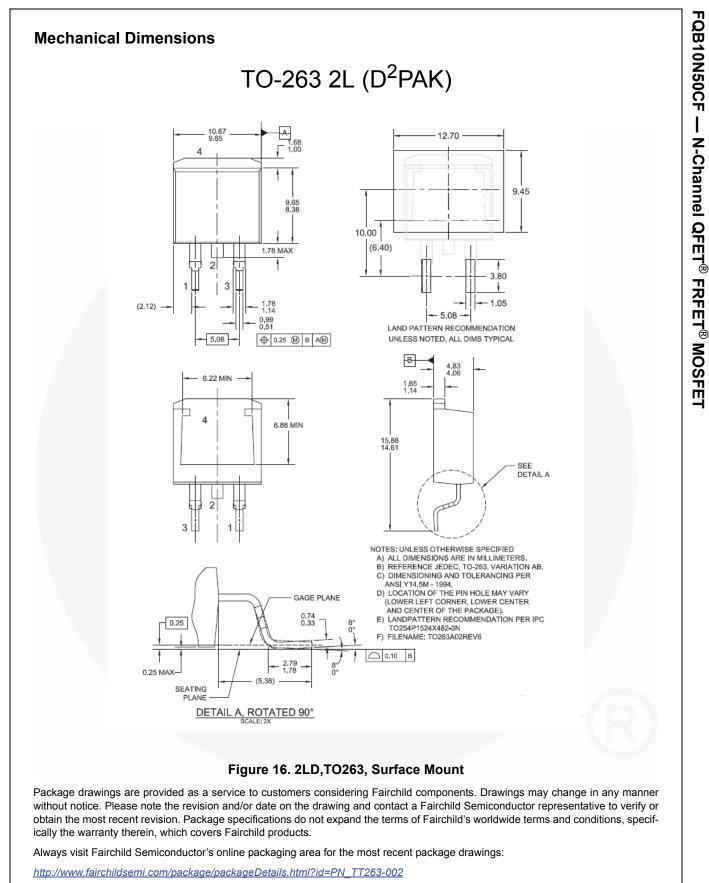


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





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