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FDMC8200S

Dual N-Channel PowerTrench[®] MOSFET 30 V, 10 m Ω , 20 m Ω

Features

- Q1: N-Channel
- Max $r_{DS(on)} = 20 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 6 \text{ A}$
- Max $r_{DS(on)}$ = 32 m Ω at V_{GS} = 4.5 V, I_D = 5 A

Q2: N-Channel

- Max $r_{DS(on)}$ = 10 m Ω at V_{GS} = 10 V, I_D = 8.5 A
- Max $r_{DS(on)}$ = 13.5 m Ω at V_{GS} = 4.5 V, I_D = 7.2 A
- RoHS Compliant

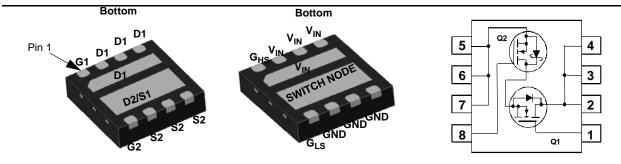


General Description

This device includes two specialized N-Channel MOSFETs in a due power33(3mm X 3mm MLP) package. The switch node has been internally connected to enable easy placement and routing of synchronous buck converters. The control MOSFET (Q1) and synchronous MOSFET (Q2) have been designed to provide optimal power efficiency.

Applications

- Mobile Computing
- Mobile Internet Devices
- General Purpose Point of Load



Power33

MOSFET Maximum Ratings $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter			Q1	Q2	Units	
V _{DS}	Drain to Source Voltage			30	30	V	
V _{GS}	Gate to Source Voltage		(Note 4)	±20	±20	V	
I _D	Drain Current -Continuous (Package limited)	T _C = 25 °C		18	13		
	-Continuous (Silicon limited) $T_C = 25 \text{ °C}$			23	46	<u>,</u>	
	-Continuous	T _A = 25 °C		6 ^{1a}	8.5 ^{1b}	A	
	-Pulsed			40	27	-	
E _{AS}	Single Pulse Avalanche Energy		(Note 3)	12	32		
P _D	Power Dissipation for Single Operation	T _A = 25°C		1.9 ^{1a}	2.5 ^{1b}	14/	
	Power Dissipation for Single Operation $T_A = 25^{\circ}C$			0.7 ^{1c}	1.0 ^{1d}	W	
T _J , T _{STG}	Operating and Storage Junction Temperature Range			-55 to	+150	°C	

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	65 ^{1a}	50 ^{1b}	
R_{\thetaJA}	Thermal Resistance, Junction to Ambient	180 ^{1c}	125 ^{1d}	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	7.5	4.2	

Package Marking and Ordering Information

Γ	Device Marking	Device	Package	Reel Size	Tape Width	Quantity
	FDMC8200S	FDMC8200S	Power 33	13"	12 mm	3000 units

March 2011

FDMC8200S Dual	
Dual N-Channel I	
l PowerTrench [®]	
MOSFET	

Symbol	Parameter	Test Conditions	Туре	Min	Тур	Max	Units
Off Chara	cteristics						
BV _{DSS}	Drain to Source Breakdown Voltage	$ I_D = 250 \ \mu\text{A}, \ \text{V}_{GS} = 0 \ \text{V} \\ I_D = 1 \text{mA}, \ \text{V}_{GS} = 0 \ \text{V} $	Q1 Q2	30 30			V
ΔΒV _{DSS} ΔΤ _J	Breakdown Voltage Temperature Coefficient	$I_D = 250 \ \mu$ A, referenced to 25°C $I_D = 1$ mA, referenced to 25°C	Q1 Q2		14 13		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24$ V, $V_{GS} = 0$ V	Q1 Q2			1 500	μA
I _{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20$ V, $V_{DS} = 0$ V	Q1 Q2			100 100	nA nA
On Chara	cteristics						
V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \ \mu A$ $V_{GS} = V_{DS}, I_D = 1mA$	Q1 Q2	1.0 1.0	2.3 2.0	3.0 3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \mu A$, referenced to 25°C $I_D = 1mA$, referenced to 25°C	Q1 Q2		-5 -6		mV/°C
_	Static Drain to Source On Resistance		Q1		16 24 22	20 32 28	- mΩ
r _{DS(on)}			Q2		7.8 10.3 11.4	10.0 13.5 13.1	
9 _{FS}	Forward Transconductance	$V_{DD} = 5 V, I_D = 6 A$ $V_{DD} = 5 V, I_D = 8.5 A$	Q1 Q2		29 43		S
Dynamic	Characteristics						
C _{iss}	Input Capacitance		Q1 Q2		495 1080	660 1436	pF
C _{oss}	Output Capacitance	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHZ	Q1 Q2		145 373	195 495	pF
C _{rss}	Reverse Transfer Capacitance		Q1 Q2		20 35	30 52	pF
R _g	Gate Resistance		Q1 Q2	0.2 0.2	1.4 1.2	4.2 3.6	Ω
Switching	g Characteristics						
t _{d(on)}	Turn-On Delay Time	Q1	Q1 Q2		11 7.6	20 15	ns
t _r	Rise Time	V_{DD} = 15 V, I _D = 1 A, V _{GS} = 10 V, R _{GEN} = 6 Ω	Q1 Q2		3.1 1.8	10 10	ns
t _{d(off)}	Turn-Off Delay Time	Q2 V _{DD} = 15 V, I _D = 1 A,	Q1 Q2		35 21	56 34	ns
t _f	Fall Time	$V_{GS} = 10$ V, $R_{GEN} = 6$ Ω	Q1 Q2		1.3 8.5	10 17	ns
Q _{g(TOT)}	Total Gate Charge	$V_{GS} = 0 V \text{ to } 10 V$ Q1	Q1 Q2		7.3 15.7	10 22	nC
Q _{g(TOT)}	Total Gate Charge	$V_{GS} = 0 V \text{ to } 4.5 V$ $I_D = 6 A$	Q1 Q2		3.1 7.2	4.3 10	nC
		+	04		4.0		

Gate to Source Charge

Gate to Drain "Miller" Charge

 Q_gs

 Q_{gd}

nC

nC

Q1

Q2

Q1

Q2

Q2 V_{DD} = 15 V I_D = 8.5 A 1.8

3

1

1.9

Min	Тур	Max	Units
	0.8	1.2	
	0.8	1.2	V
	0.6	0.8	
	13	24	20
	20	32	ns
	2.3	10	nC
	15	24	nc
d by de	esign while	R _{θCA is de}	termined
	mounted or 2 oz copp		



Drain-Source Diode Characteristics $V_{GS} = 0 V, I_S = 6 A$ (Note 2) Q1 $V_{GS} = 0 V, I_{S} = 8.5 A$ Source-Drain Diode Forward Voltage (Note 2) Q2 $V_{GS} = 0 V, I_{S} = 1.3 A$ (Note 2) Q2 Q1 Q1 **Reverse Recovery Time** $I_F = 6$ A, di/dt = 100 A/s Q2 Q2 Q1 **Reverse Recovery Charge** I_F = 8.5 A, di/dt = 300 A/s Q2

Electrical Characteristics T_J = 25°C unless otherwise noted

Parameter

Notes:

V_{SD}

t_{rr}

Q_{rr}

Symbol

R_{θJA} is determined with the device mounted on a 1in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. R_{θJC} is guarant by the user's board design.

Test Conditions

Type

b.50 °

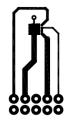
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c. 180 °C/W when mounted on a minimum pad of 2 oz copper

a.65 °C/W when mounted on

a 1 in2 pad of 2 oz copper



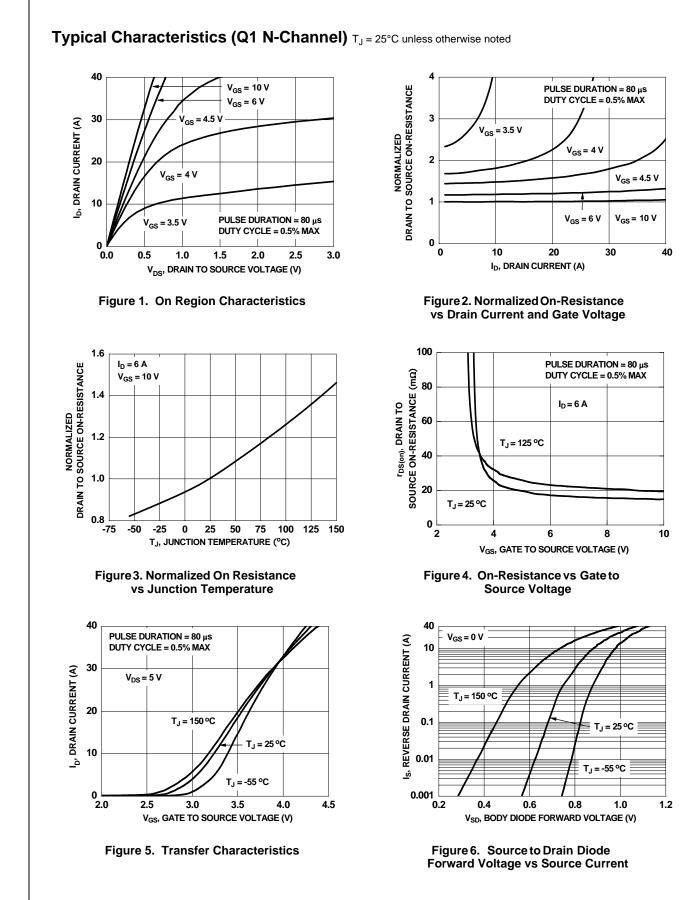
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d. 125 °C/W when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300 $\,\mu\text{s},$ Duty cycle < 2.0%.

3.Starting Q1: T = 25 °C, L = 1 mH, I = 5 A, Vgs = 10V, Vdd = 27V, 100% test at L = 3 mH, I = 4 A; Q2: T = 25°C, L = 1 mH, I = 8 A, Vgs = 10V, Vdd = 27V, 100% test at L = 3 mH, I = 3.2 A.

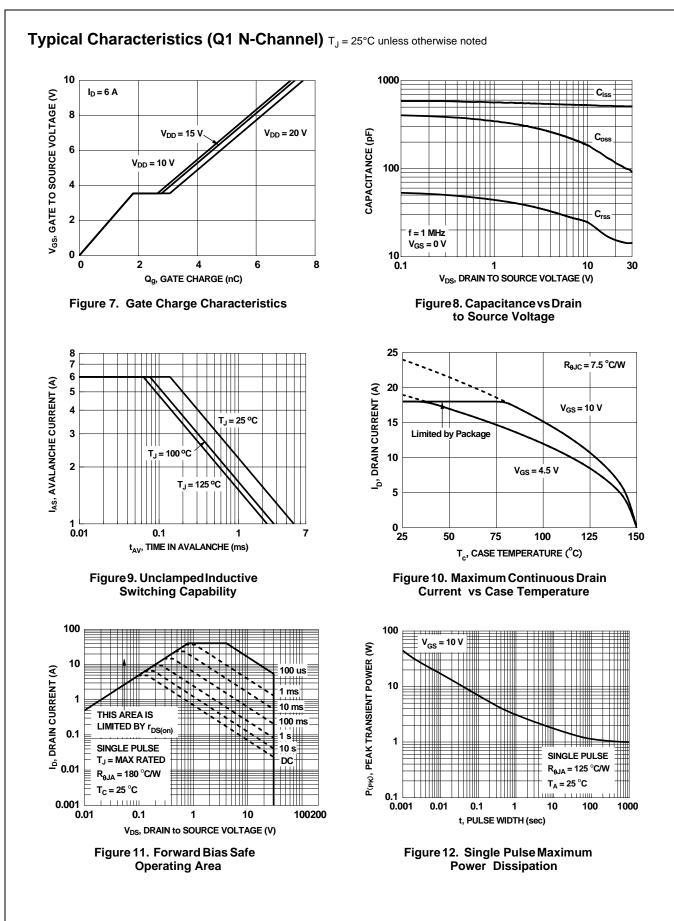
4. As an N-ch device, the negative Vgs rating is for low duty cycle pulse ocurrence only. No continuous rating is implied.

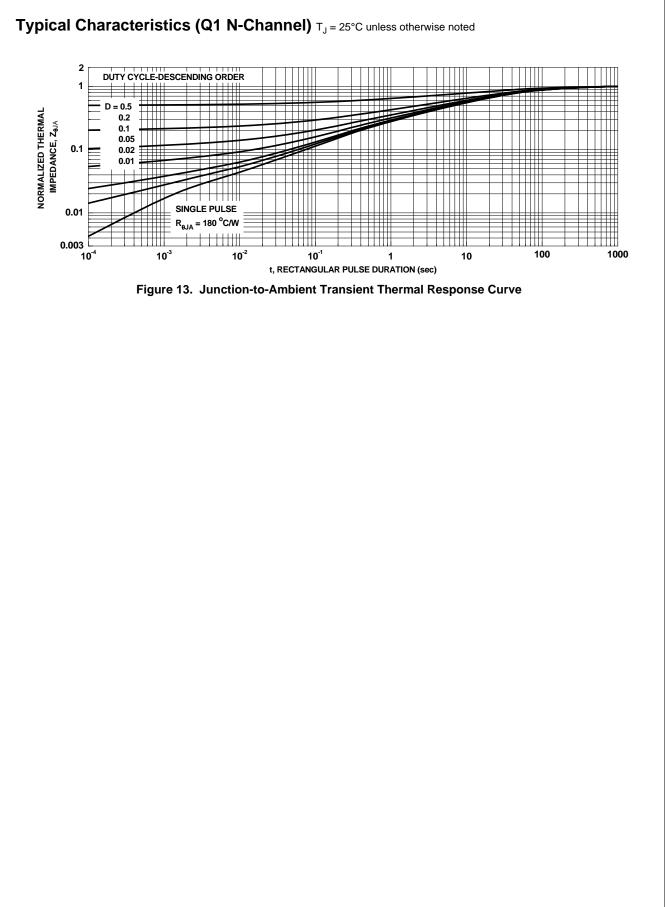


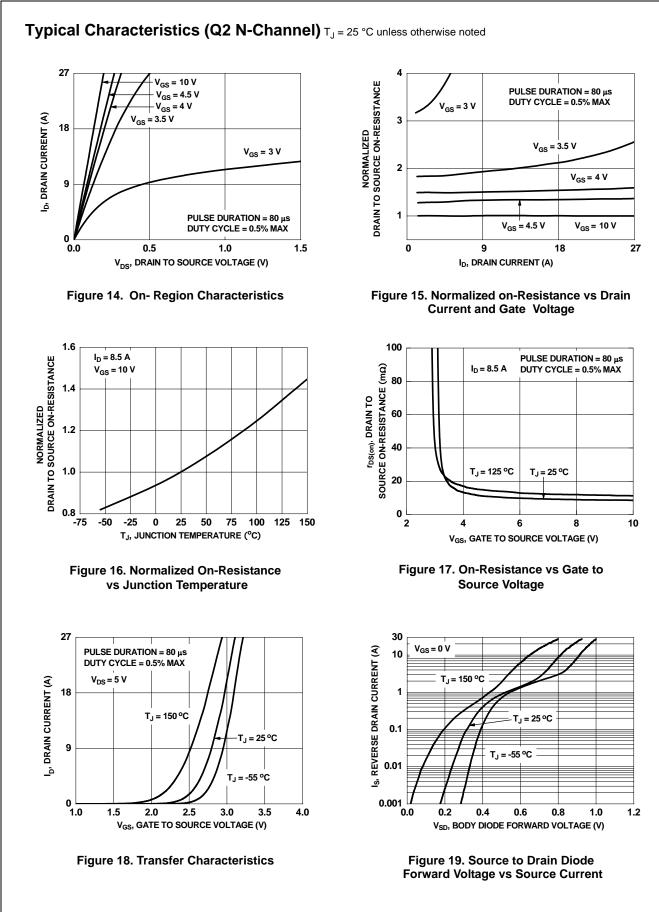
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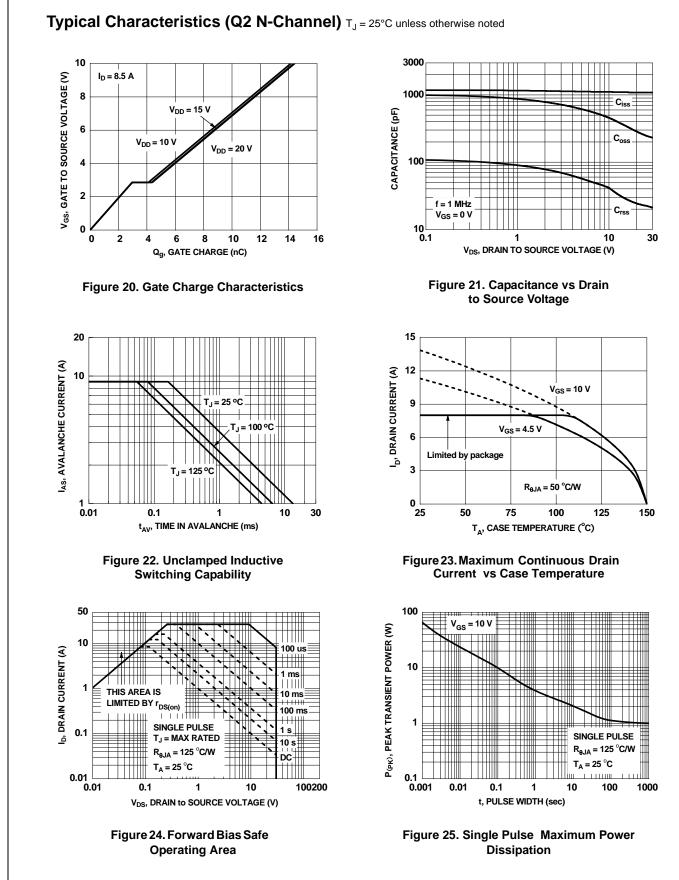




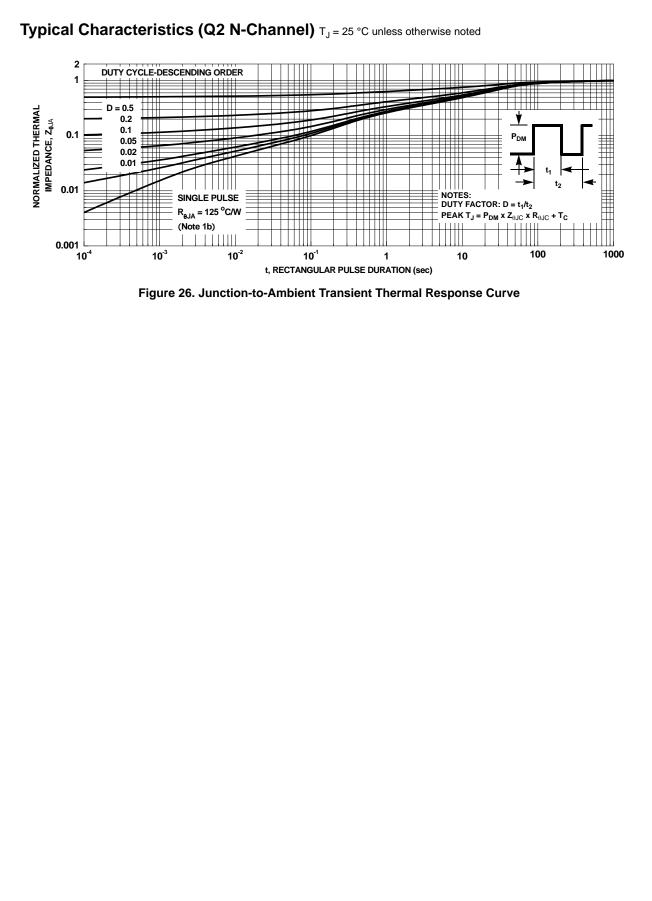


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Typical Characteristics (continued)

SyncFET Schottky body diode Characteristics

Fairchild's SyncFET process embeds a Schottky diode in parallel with PowerTrench MOSFET. This diode exhibits similar characteristics to a discrete external Schottky diode in parallel with a MOSFET. Figure 14 shows the reverses recovery characteristic of the FDMC8200S.

Schottky barrier diodes exhibit significant leakage at high temperature and high reverse voltage. This will increase the power in the device.

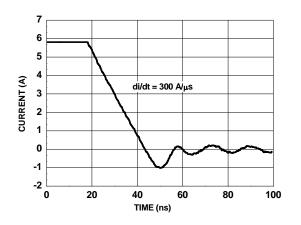
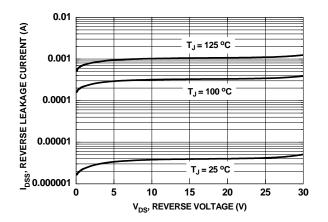
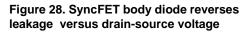
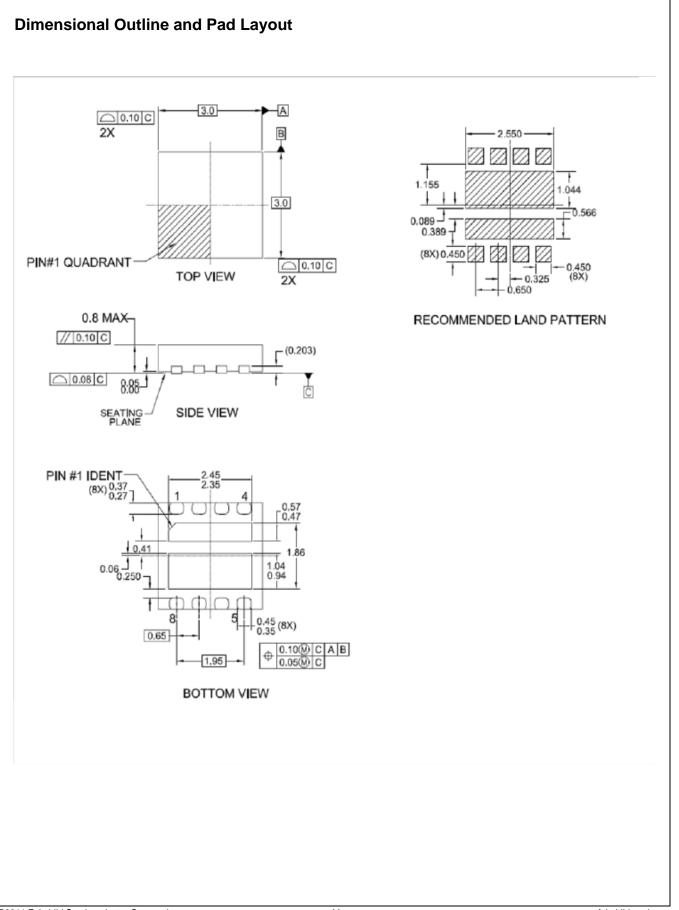
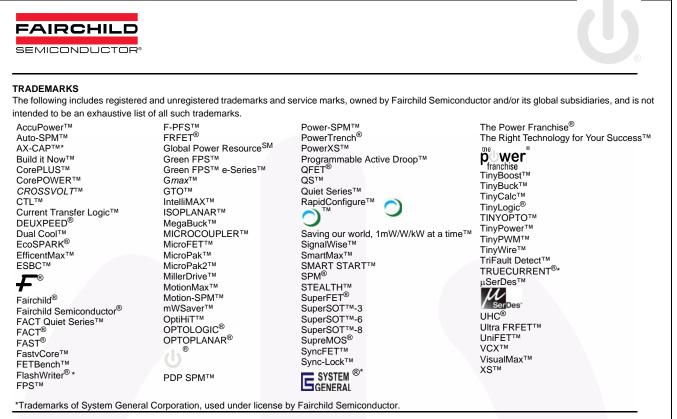


Figure 27. FDMC8200S SyncFET body diode reverse recovery characteristic









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