Rochester Electronics

Datasheet

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)

• Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

FAIRCHILD SEMICONDUCTOR®

April 2009

FDMS7670

N-Channel PowerTrench® MOSFET

30 V, 3.8 mΩ

Features

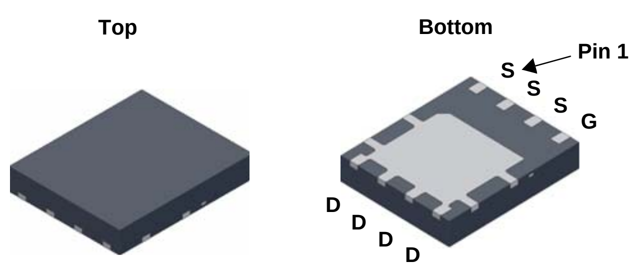
- Max $r_{DS(on)}$ = 3.8 mΩ at V_{GS} = 10 V, I_D = 21 A
- Max $r_{DS(on)}$ = 5.0 mΩ at V_{GS} = 4.5 V, I_D = 17 A
- Advanced Package and Silicon design for low $r_{DS(on)}$ and high efficiency
- Next generation enhanced body diode technology, engineered for soft recovery. Provides Schottky-like performance with minimum EMI in sync buck converter applications
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

General Description

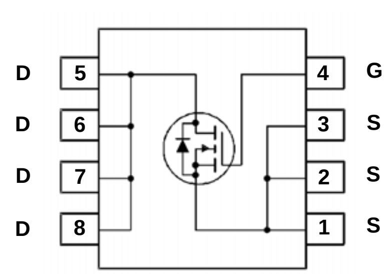
This N-Channel MOSFET has been designed specifically to improve the overall efficiency and to minimize switch node ringing of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(on)}$, fast switching speed and body diode reverse recovery performance.

Applications

- IMVP Vcore Switching for Notebook
- VRM Vcore Switching for Desktop and Server
- OringFET / Load Switch
- DC-DC Conversion



Power 56



MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			30	V
V_{GS}	Gate to Source Voltage		(Note 4)	±20	V
I_D	Drain Current -Continuous (Package limited)	T_C = 25 °C		42	A
	-Continuous (Silicon limited)	T_C = 25 °C		105	
	-Continuous	T_A = 25 °C	(Note 1a)	21	
	-Pulsed			150	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	144	mJ
P_D	Power Dissipation	T_C = 25 °C		62	W
	Power Dissipation	T_A = 25 °C	(Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		2.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	50	

Package Marking and Ordering Information

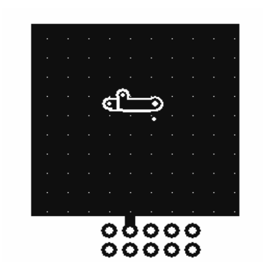
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS7670	FDMS7670	Power 56	13 ”	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

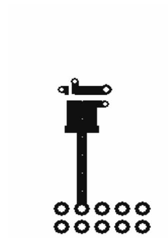
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		15		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, I_D = 250 μA	1.25	1.9	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-7		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 21 A		2.9	3.8	mΩ
		V_{GS} = 4.5 V, I_D = 17 A		4.1	5.0	
		V_{GS} = 10 V, I_D = 21 A, T_J = 125 °C		4.0	5.3	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 21 A		136		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		3085	4105	pF
C_{oss}	Output Capacitance			990	1315	pF
C_{rss}	Reverse Transfer Capacitance			75	115	pF
R_g	Gate Resistance			1.2	2.5	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15 V, I_D = 21 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		15	26	ns
t_r	Rise Time			6	12	ns
$t_{d(off)}$	Turn-Off Delay Time			31	50	ns
t_f	Fall Time			5	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 15 V, I_D = 21 A		40	56	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 4.5 V; V_{DD} = 15 V, I_D = 21 A		17	24	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 15 V, I_D = 21 A		9.8		nC
Q_{gd}	Gate to Drain "Miller" Charge			4.4		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.1 A (Note 2)		0.7	0.95	V
		V_{GS} = 0 V, I_S = 21 A (Note 2)		0.8	1.1	
t_{rr}	Reverse Recovery Time	I_F = 21 A, di/dt = 100 A/μs		38	61	ns
Q_{rr}	Reverse Recovery Charge			19	34	nC
t_a	Reverse Recovery Fall Time			14		ns
t_b	Reverse Recovery Rise Time			24		ns
S	Softness (t_b/t_a)			1.7		
t_{rr}	Reverse Recovery Time	I_F = 21 A, di/dt = 300 A/μs		32	51	ns
Q_{rr}	Reverse Recovery Charge			34	54	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 50 °C/W when mounted on a 1 in^2 pad of 2 oz copper.



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

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 144 mJ is based on starting T_J = 25 °C, L = 1 mH, I_{AS} = 17 A, V_{DD} = 27 V, V_{GS} = 10 V. 100% test at L = 0.3 mH, I_{AS} = 22 A.
4. As an N-ch device, the negative Vgs rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

Typical Characteristics T_J = 25 °C unless otherwise noted

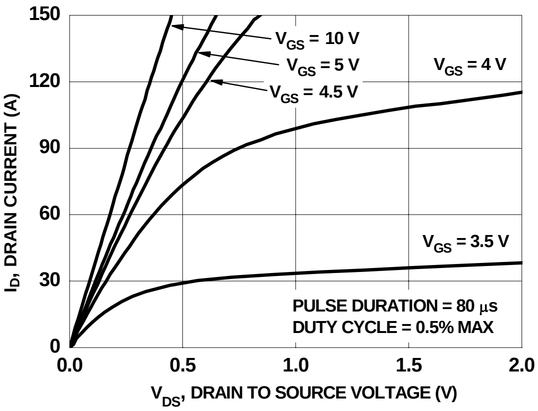


Figure 1. On Region Characteristics

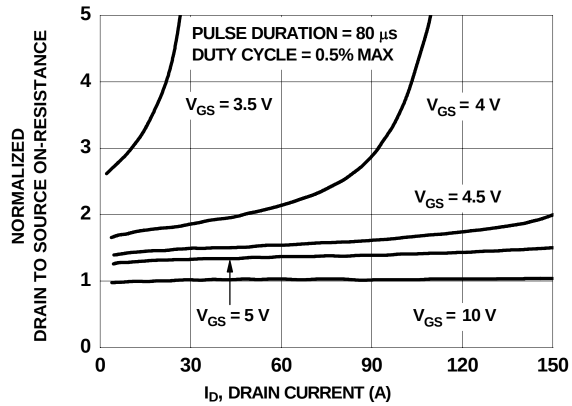


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

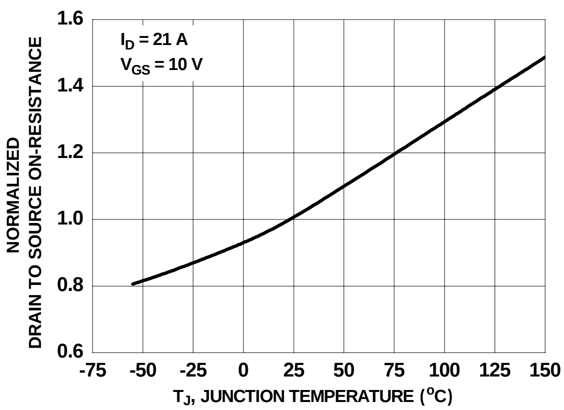


Figure 3. Normalized On Resistance vs Junction Temperature

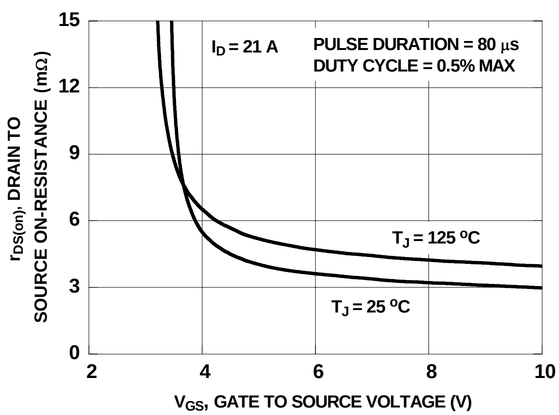


Figure 4. On-Resistance vs Gate to Source Voltage

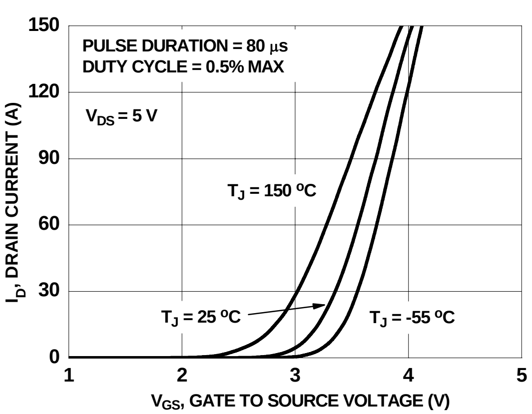


Figure 5. Transfer Characteristics

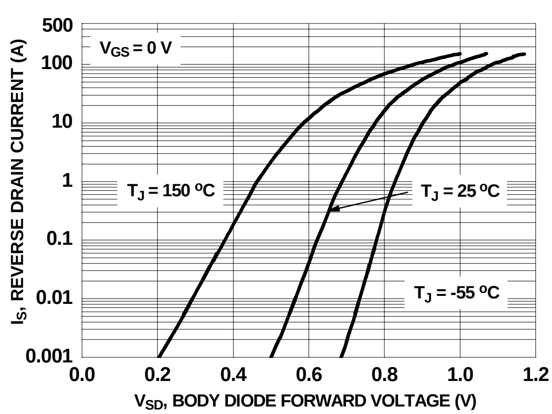


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

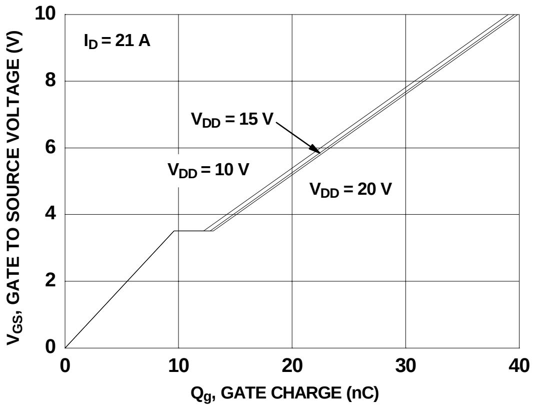


Figure 7. Gate Charge Characteristics

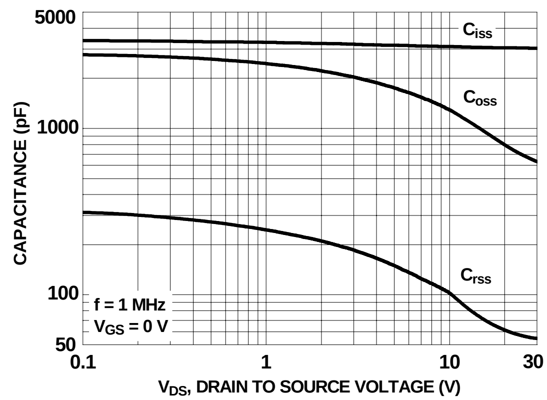


Figure 8. Capacitance vs Drain to Source Voltage

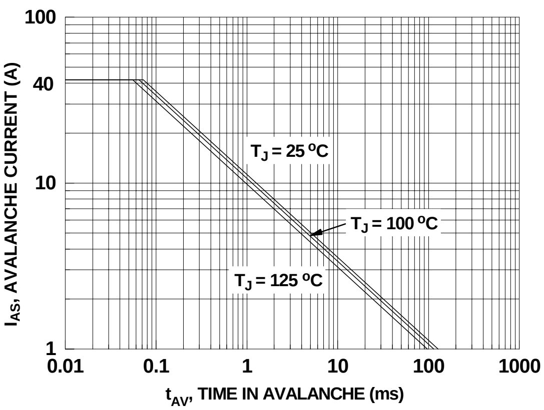


Figure 9. Unclamped Inductive Switching Capability

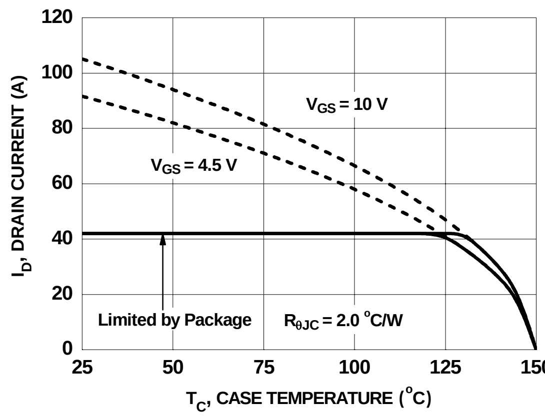


Figure 10. Maximum Continuous Drain Current vs Case Temperature

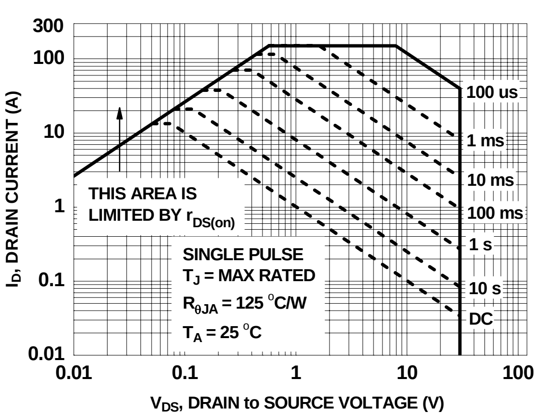


Figure 11. Forward Bias Safe Operating Area

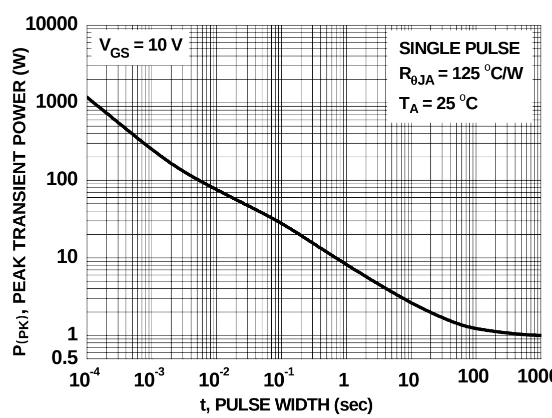


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

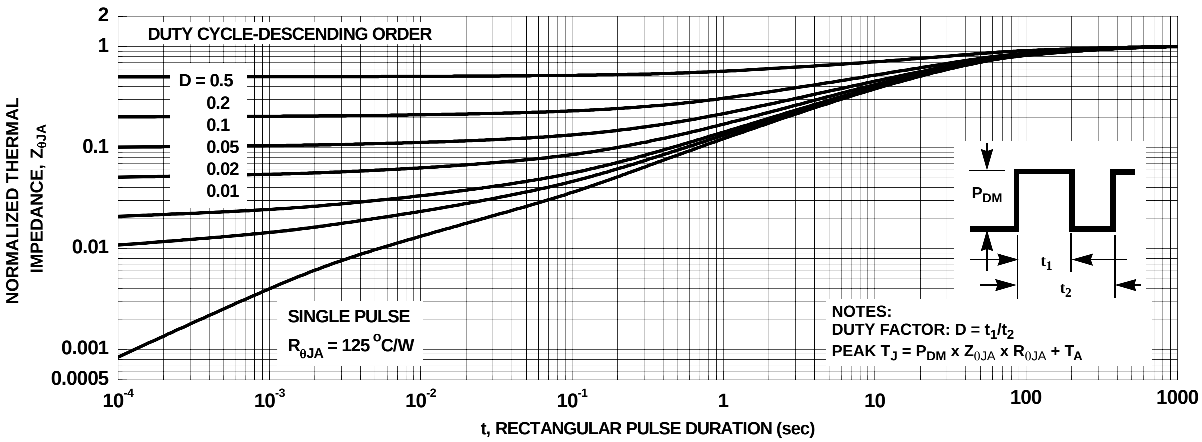


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

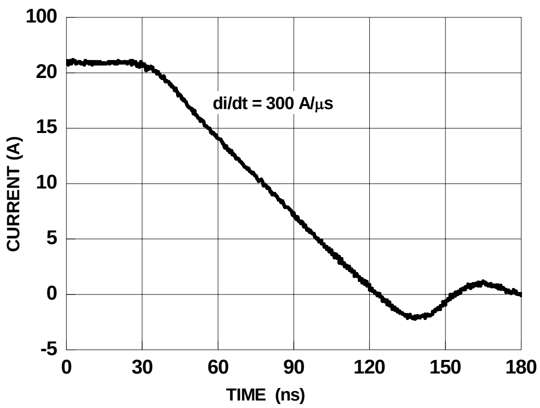
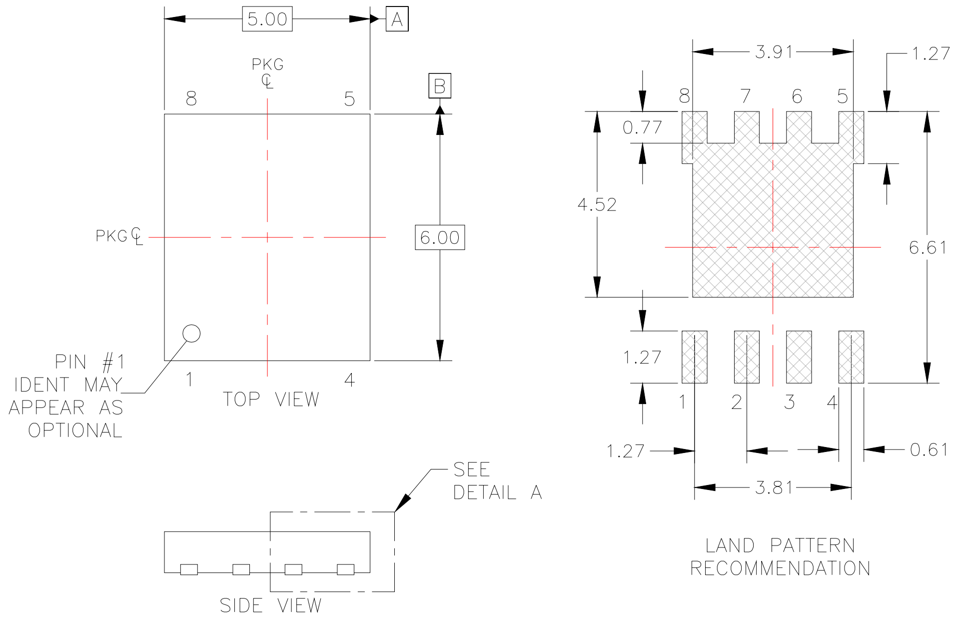
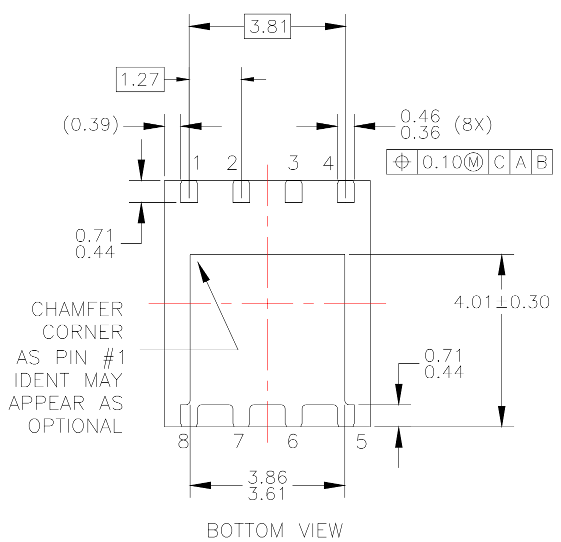
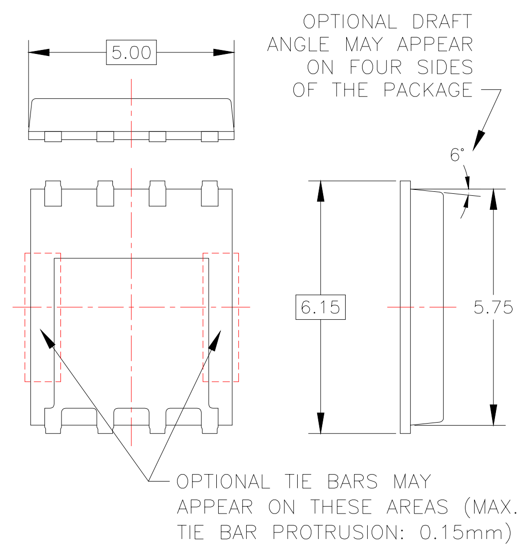


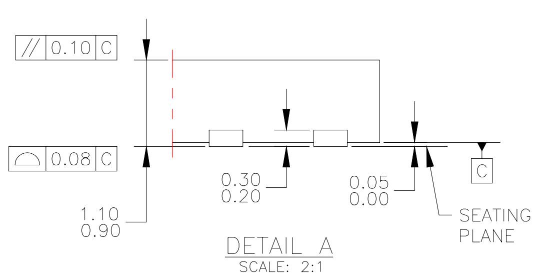
Figure 14. Body Diode Reverse Recovery Characteristics

Dimensional Outline and Pad Layout









NOTES: UNLESS OTHERWISE SPECIFIED

A) PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. AA, DATED OCTOBER 2002.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
E) DRAWING FILE NAME: PQFN08AREV4

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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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