

Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild guestions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any EDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officer



FDS2670

200V N-Channel PowerTrench® MOSFET

General Description

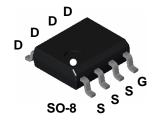
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

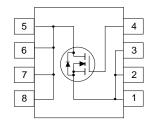
These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $RDS_{(\text{ON})}$ specifications.

The result is a MOSFET that is easy and safer to drive (even at very high frequencies), and DC/DC power supply designs with higher overall efficiency.

Features

- 3.0 A, 200 V. $R_{DS(ON)} = 130 \text{ m}\Omega$ @ $V_{GS} = 10 \text{ V}$
- Low gate charge
- · Fast switching speed
- High performance trench technology for extremely low $R_{\mbox{\scriptsize DS(ON)}}$
- High power and current handling capability





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		200	V
V_{GSS}	Gate-Source Voltage		±20	V
I _D	Drain Current - Continuous	(Note 1a)	3.0	A
	- Pulsed		20	
P _D	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.2	
		(Note 1c)	1.0	
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	3.2	V/ns
T_J , T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	50	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1c)	125	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	25	°C/W

Package Marking and Ordering Information

Device Marking Device		Reel Size	Tape width	Quantity	
FDS2670	FDS2670	13"	12mm	2500 units	

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Drain-So	ource Avalanche Ratings (Note	1)	1		I	
W _{DSS}	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 100 \text{ V}, I_{D} = 3.0 \text{ A}$			375	mJ
I _{AR}	Maximum Drain-Source Avalanche Current				3.0	Α
Off Char	acteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, \qquad I_{D} = 250 \mu\text{A}$	200			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C		214		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 160 \text{ V}, V_{GS} = 0 \text{ V}$			1	μΑ
I _{GSSF}	Gate-Body Leakage, Forward	$V_{GS} = 20 \text{ V}, \qquad V_{DS} = 0 \text{ V}$			100	nA
I _{GSSR}	Gate-Body Leakage, Reverse	$V_{GS} = -20 \text{ V}$ $V_{DS} = 0 \text{ V}$			-100	nA
On Char	acteristics (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	2	4	4.5	V
$\Delta V_{GS(th)} \over \Delta T_J$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C		-10		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	$V_{GS} = 10 \text{ V}, I_D = 3.0 \text{ A}$ $V_{GS} = 10 \text{ V}, I_D = 3.0 \text{ A}, T_J = 125 ^{\circ}\text{C}$		100 205	130 275	mΩ
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10 \text{ V}, \qquad V_{DS} = 10 \text{ V}$	20			Α
g FS	Forward Transconductance	$V_{DS} = 10 \text{ V}, \qquad I_{D} = 3.0 \text{ A}$		15		S
Dynamic	Characteristics					
C _{iss}	Input Capacitance	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V},$		1228		pF
Coss	Output Capacitance	f = 1.0 MHz		112		pF
C _{rss}	Reverse Transfer Capacitance			17		pF
Switchir	ng Characteristics (Note 2)					
t _{d(on)}	Turn-On Delay Time	$V_{DD} = 100 \text{ V}, I_D = 1 \text{ A},$		13	23	ns
t _r	Turn-On Rise Time	$V_{GS} = 10 \text{ V}, \qquad R_{GEN} = 6 \Omega$		8	16	ns
$t_{\text{d(off)}}$	Turn-Off Delay Time			30	48	ns
t _f	Turn-Off Fall Time			25	40	ns
Qg	Total Gate Charge	$V_{DS} = 100 \text{ V}, I_{D} = 3 \text{ A},$		27	43	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 10 V		7		nC
Q_{gd}	Gate-Drain Charge			10		nC
Drain-S	ource Diode Characteristics	and Maximum Ratings				
Is	Maximum Continuous Drain-Source				2.1	Α
V _{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, \qquad I_S = 2.1 \text{ A (Note 2)}$		0.7	1.2	V

Notes:

1. R_{BJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{BJC} is guaranteed by design while R_{BCA} is determined by the user's board design.



a) 50°/W when mounted on a 1in² pad of 2 oz copper



b) 105°/W when mounted on a 0.04 in² pad of 2 oz copper



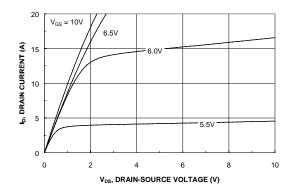
c) 125°/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < 300μ s, Duty Cycle < 2.0%

3. $I_{SD} \leq 3A$, di/dt $\leq 100A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}C$

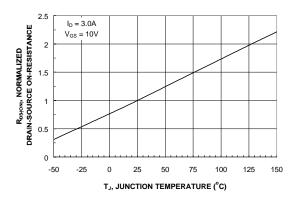
Typical Characteristics



1.6 | OBS | 1.4 | OBS | 5.5V | OBS | 5.5V | OBS | 1.2 | OBS | OBS

Figure 1. On-Region Characteristics.

Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.



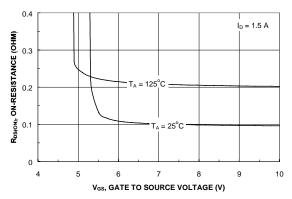
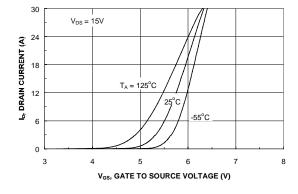


Figure 3. On-Resistance Variation with Temperature.

Figure 4. On-Resistance Variation with Gate-to-Source Voltage.



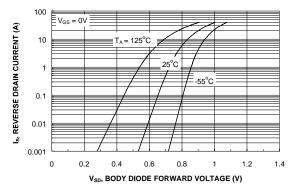
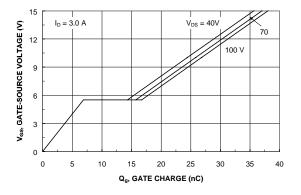


Figure 5. Transfer Characteristics.

Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics



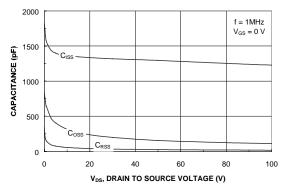
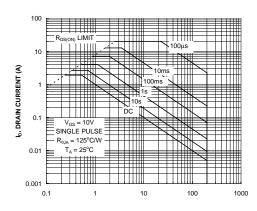


Figure 7. Gate Charge Characteristics.





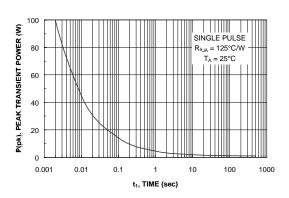


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

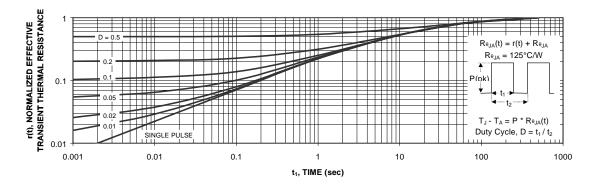


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c. Transient thermal response will change depending on the circuit board design.

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

SMART START™ VCX^{TM} FAST ® OPTOLOGIC™ STAR*POWER™ FASTr™ Bottomless™ OPTOPLANAR™ Stealth™ CoolFET™ FRFET™ PACMAN™ SuperSOT™-3 CROSSVOLT™ GlobalOptoisolator™ POP™ SuperSOT™-6 DenseTrench™ GTO™ Power247™ $HiSeC^{TM}$ SuperSOT™-8 $Power Trench^{\, @}$ DOME™ SyncFET™ EcoSPARK™ ISOPLANAR™ QFET™ TinyLogic™ E²CMOSTM LittleFET™ OS^{TM} TruTranslation™

STAR*POWER is used under license

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

Rev. H4

ON Semiconductor and in are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdt/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor and see any inability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and ex

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada Email: orderlit@onsemi.com N. American Technical Support: 800–282–9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81–3–5817–1050

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative