

FDP2670/FDB2670

200V N-Channel PowerTrench® MOSFET

General Description

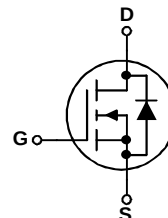
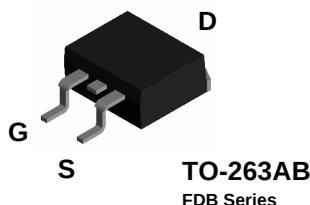
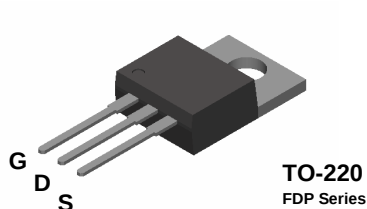
This N-Channel MOSFET has been designed specifically for switching on the primary side in the isolated DC/DC converter application. Any application requiring a 200V MOSFETs with low on-resistance and fast switching will benefit.

These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ 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

- 19 A, 200 V. $R_{DS(ON)} = 130 \text{ m}\Omega$ @ $V_{GS} = 10 \text{ V}$
- Low gate charge (27 nC typical)
- Fast switching speed
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability



Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ 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 1)	19	A
	– Pulsed (Note 1)	40	A
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	93	W
	Derate above 25°C	0.63	W/ $^\circ\text{C}$
dv/dt	Peak Diode Recovery dv/dt (Note 3)	3.2	V/ns
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-65 to $+175$	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.6	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDB2670	FDB2670	13"	24mm	800 units
FDP2670	FDP2670	Tube	n/a	45 units

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Drain-Source Avalanche Ratings (Note 1)						
W _{DSS}	Single Pulse Drain-Source Avalanche Energy	V _{DD} = 100 V, I _D = 10 A			375	mJ
I _{AR}	Maximum Drain-Source Avalanche Current				10	A
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	200			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		241		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 160 V, V _{GS} = 0 V			1	μA
I _{GSSF}	Gate-Body Leakage, Forward	V _{GS} = 20 V, V _{DS} = 0 V			100	nA
I _{GSSR}	Gate-Body Leakage, Reverse	V _{GS} = -20 V V _{DS} = 0 V			-100	nA
On Characteristics (Note 2)						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	2	4	4.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		-9		mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 10 A V _{GS} = 10V, I _D = 10 A, T _J = 125°C		98 205	130 285	mΩ
I _{D(on)}	On-State Drain Current	V _{GS} = 10 V, V _{DS} = 10 V	20			A
g _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 10 A		24		S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 100 V, V _{GS} = 0 V,		1320		pF
C _{oss}	Output Capacitance	f = 1.0 MHz		71		pF
C _{rss}	Reverse Transfer Capacitance			24		pF
Switching Characteristics (Note 2)						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 100 V, I _D = 1 A,		14	25	ns
t _r	Turn-On Rise Time	V _{GS} = 10 V, R _{GEN} = 6 Ω		5	10	ns
t _{d(off)}	Turn-Off Delay Time			26	41	ns
t _f	Turn-Off Fall Time			23	37	ns
Q _g	Total Gate Charge	V _{DS} = 100 V, I _D = 10 A,		27	38	nC
Q _{gs}	Gate-Source Charge	V _{GS} = 10 V		7		nC
Q _{gd}	Gate-Drain Charge			10		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current				19	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 10 A (Note 2)		0.8	1.3	V

Notes:

1. Calculated continuous current based on maximum allowable junction temperature.
2. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%
3. $I_{SD} \leq 3\text{ A}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

Typical Characteristics

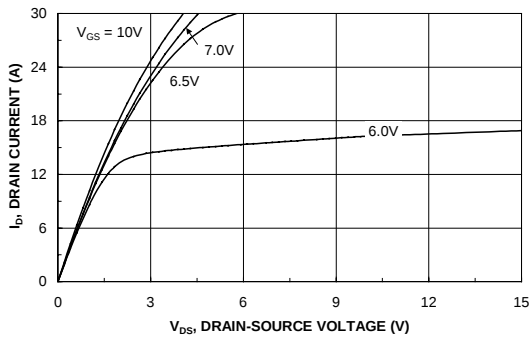


Figure 1. On-Region Characteristics.

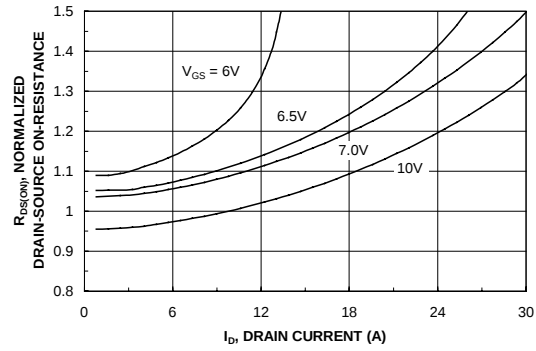


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

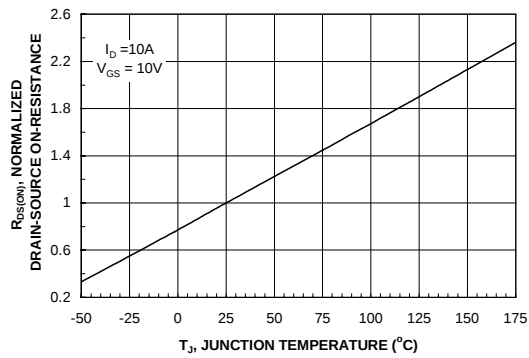


Figure 3. On-Resistance Variation with Temperature.

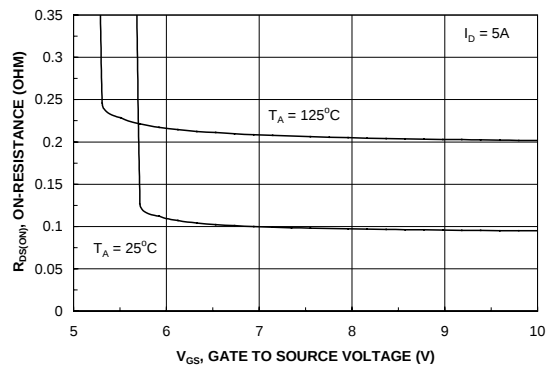


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

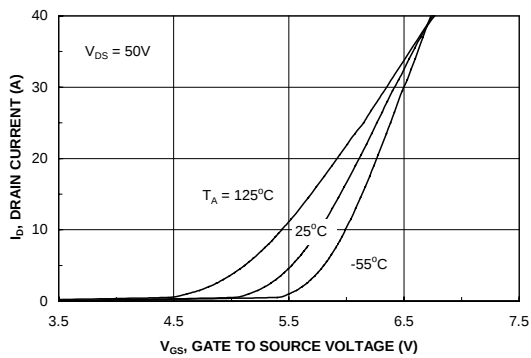


Figure 5. Transfer Characteristics.

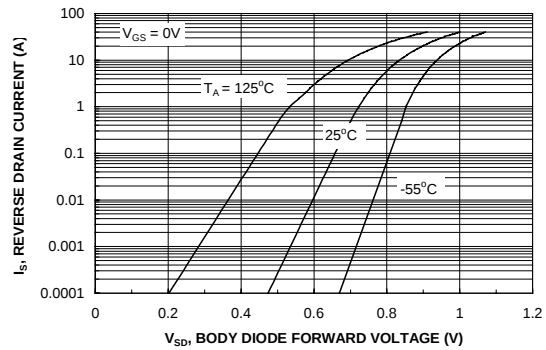


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

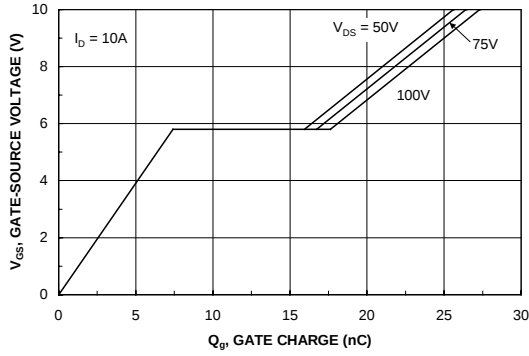


Figure 7. Gate Charge Characteristics.

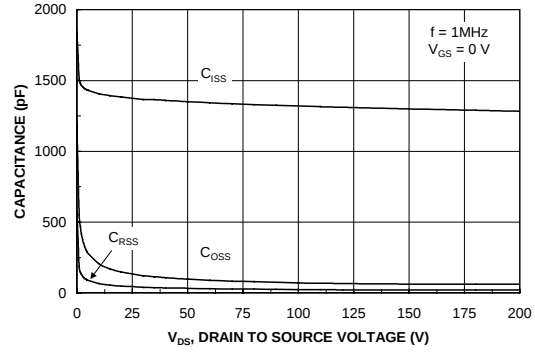


Figure 8. Capacitance Characteristics.

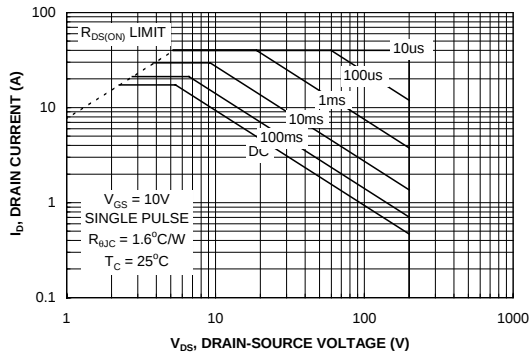


Figure 9. Maximum Safe Operating Area.

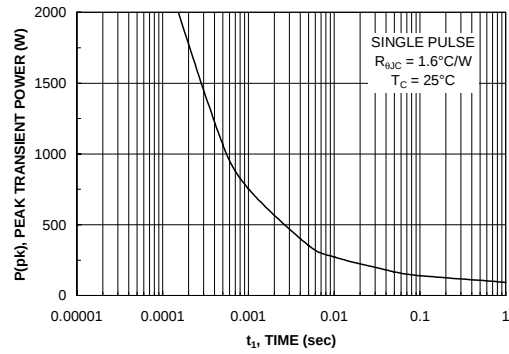


Figure 10. Single Pulse Maximum Power Dissipation.

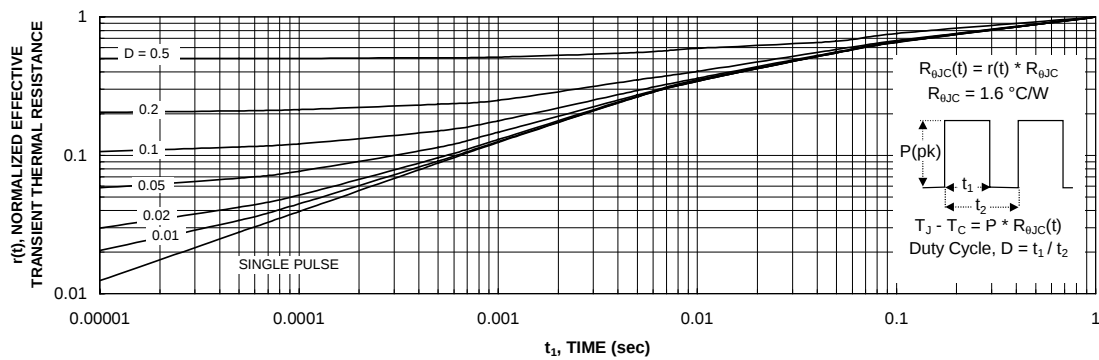


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1.
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.

ACE ^{Ex} TM	FAST [®]	OPTOLOGIC TM	SMART START TM	VCX TM
Bottomless TM	FAST ^r TM	OPTOPLANAR TM	STAR*POWER TM	
CoolFET TM	FRFET TM	PACMAN TM	Stealth TM	
CROSSVOLT TM	GlobalOptoisolator TM	POP TM	SuperSOT TM -3	
DenseTrench TM	GTO TM	Power247 TM	SuperSOT TM -6	
DOME TM	HiSeC TM	PowerTrench [®]	SuperSOT TM -8	
EcoSPARK TM	ISOPLANAR TM	QFET TM	SyncFET TM	
E ² CMOS TM	LittleFET TM	QS TM	TinyLogic TM	
EnSigna TM	MicroFET TM	QT Optoelectronics TM	TruTranslation TM	
FACT TM	MicroPak TM	Quiet Series TM	UHC TM	
FACT Quiet Series TM	MICROWIRE TM	SILENT SWITCHER [®]	UltraFET [®]	

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 user.
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.