



element14

EN - For pricing and availability in your local country please visit one of the below links:

DE - Informationen zu Preisen und Verfügbarkeit in Ihrem Land erhalten Sie über die unten aufgeführten Links:

FR - Pour connaître les tarifs et la disponibilité dans votre pays, cliquez sur l'un des liens suivants:

[FDD3670](#)

EN
This Datasheet is presented by
the manufacturer

DE
Dieses Datenblatt wird vom
Hersteller bereitgestellt

FR
Cette fiche technique est
présentée par le fabricant

FDD3670

100V N-Channel PowerTrench[®] MOSFET

General Description

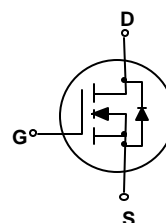
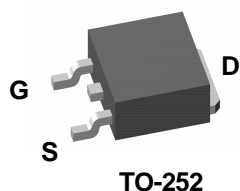
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

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

- 34 A, 100 V. $R_{DS(ON)} = 32\text{ m}\Omega$ @ $V_{GS} = 10\text{ V}$
 $R_{DS(ON)} = 35\text{ m}\Omega$ @ $V_{GS} = 6\text{ V}$
- Low gate charge (57 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	100	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous (Note 1)	34	A
	Drain Current – Pulsed (Note 3)	100	
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$ (Note 1)	83	W
	@ $T_A = 25^\circ\text{C}$ (Note 1a)	3.8	
	@ $T_A = 25^\circ\text{C}$ (Note 1b)	1.6	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +175	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	1.8	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1b)	96	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDD3670	FDD3670	13"	16mm	2500 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 2)

W_{DSS}	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 50\text{ V}$, $I_D = 7.3\text{ A}$			360	mJ
I_{AR}	Maximum Drain-Source Avalanche Current				7.3	A

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = 250\ \mu\text{A}$	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		92		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{ V}$, $V_{GS} = 0\text{ V}$			10	μA
I_{GSSF}	Gate-Body Leakage, Forward	$V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate-Body Leakage, Reverse	$V_{GS} = -20\text{ V}$, $V_{DS} = 0\text{ V}$			-100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	2	2.5	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		-7.2		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}$, $I_D = 7.3\text{ A}$ $V_{GS} = 10\text{ V}$, $I_D = 7.3\text{ A}$, $T_J = 125^\circ\text{C}$ $V_{GS} = 6\text{ V}$, $I_D = 7.0\text{ A}$		22 39 24	32 56 35	m Ω
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 5\text{ V}$	25			A
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}$, $I_D = 7.3\text{ A}$	15	31		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 50\text{ V}$, $V_{GS} = 0\text{ V}$,		2490		pF
C_{oss}	Output Capacitance	$f = 1.0\text{ MHz}$		265		pF
C_{rss}	Reverse Transfer Capacitance			80		pF

Switching Characteristics (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{ V}$, $I_D = 1\text{ A}$,		16	26	ns
t_r	Turn-On Rise Time	$V_{GS} = 10\text{ V}$, $R_{GEN} = 6\ \Omega$		10	18	ns
$t_{d(off)}$	Turn-Off Delay Time			56	84	ns
t_f	Turn-Off Fall Time			25	40	ns
Q_g	Total Gate Charge	$V_{DS} = 50\text{ V}$, $I_D = 7.3\text{ A}$,		57	80	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 10\text{ V}$		11		nC
Q_{gd}	Gate-Drain Charge			15		nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current				2.7	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = 2.7\text{ A}$ (Note 2)		0.72	1.2	V

Notes:

- $R_{\theta JA}$ 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. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) $R_{\theta JA} = 40^\circ\text{C/W}$ when mounted on a 1in^2 pad of 2oz copper.



b) $R_{\theta JA} = 96^\circ\text{C/W}$ on a minimum mounting pad.

Scale 1 : 1 on letter size paper

- Pulse Test: Pulse Width < $300\ \mu\text{s}$, Duty Cycle < 2.0%
- Pulse I_D refers to Figure.9 Forward Bias Safe Operation Area.

Typical Characteristics

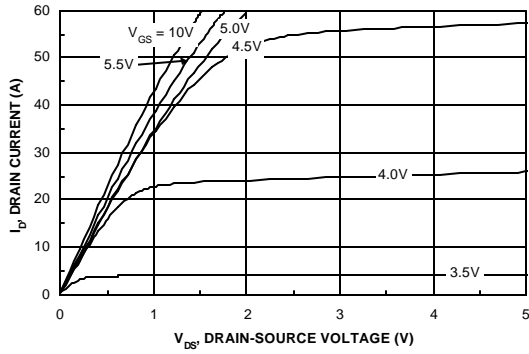


Figure 1. On-Region Characteristics.

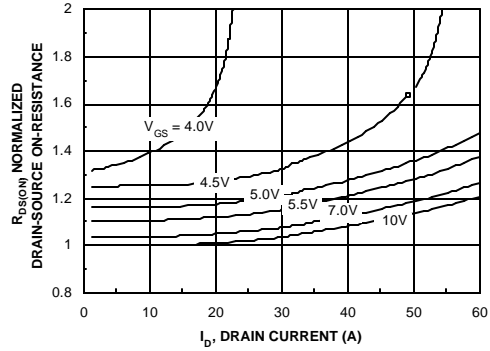


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

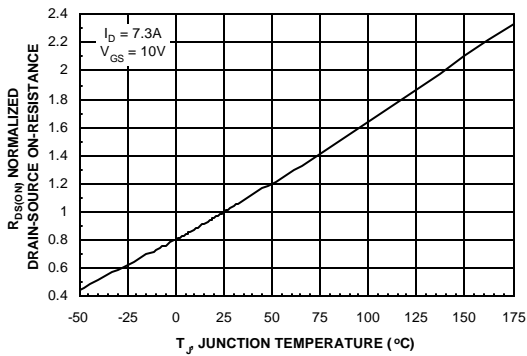


Figure 3. On-Resistance Variation with Temperature.

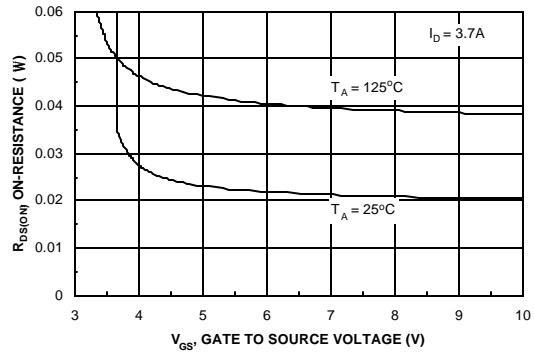


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

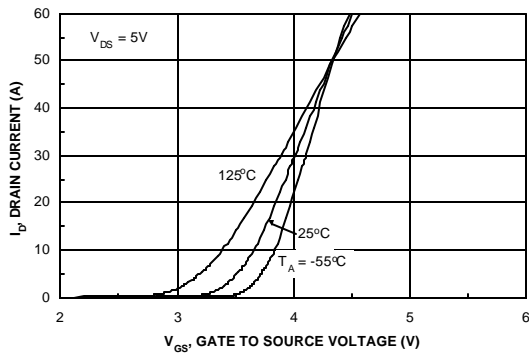


Figure 5. Transfer Characteristics.

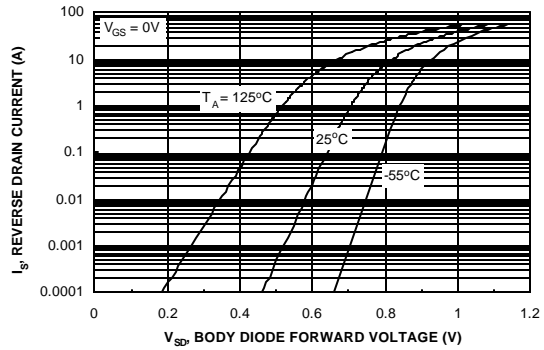


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

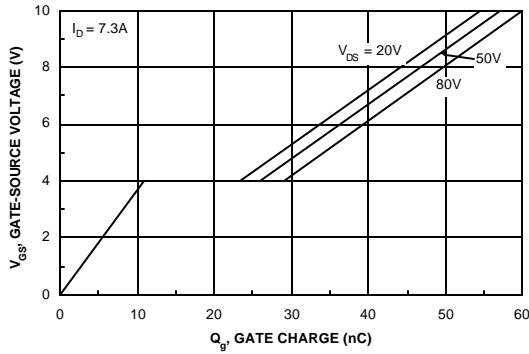


Figure 7. Gate Charge Characteristics.

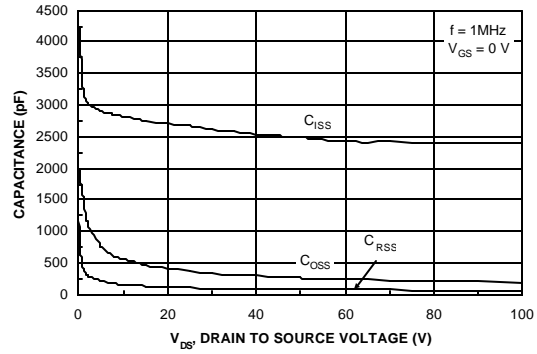


Figure 8. Capacitance Characteristics.

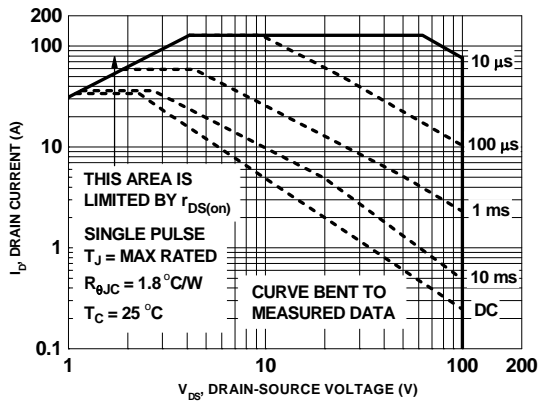


Figure 9. Forward Bias Safe Operating Area.

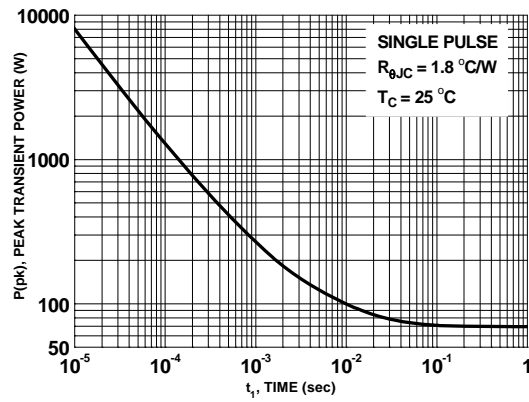


Figure 10. Single Pulse Maximum Power Dissipation.

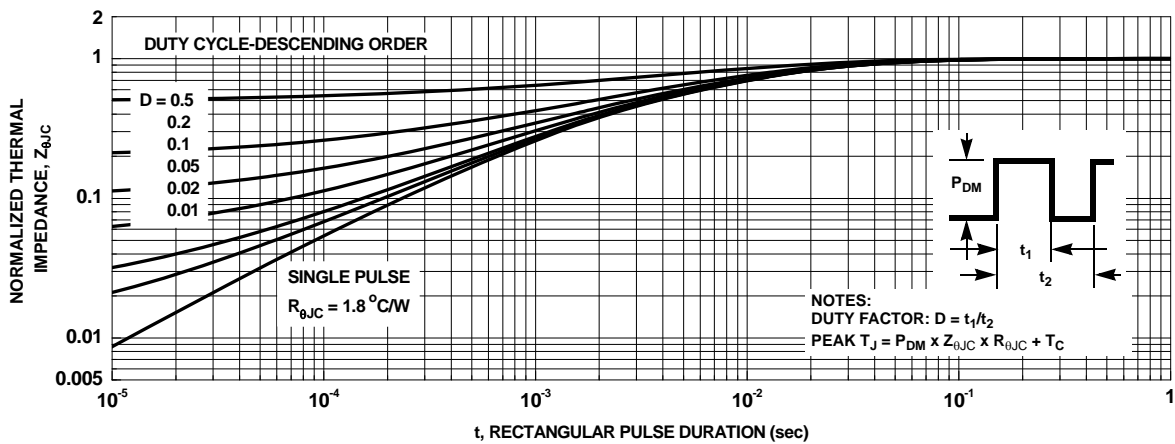



Figure 11. Junction-to-Case Transient Thermal Response Curve







TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™
AX-CAP®*
BitSiC™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficientMax™
ESBC™

Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FETBench™
FPS™

F-PFST™
FRFET®
Global Power ResourceSM
GreenBridge™
Green FPS™
Green FPS™ e-Series™
Gmax™
GTO™
IntelliMAX™
ISOPLANAR™
Marking Small Speakers Sound Louder and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
mWSaver®
OptoHit™
OPTOLOGIC®
OPTOPLANAR®


PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™

Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™
SPM®
STEALTH™
SuperFET®
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™

Sync-Lock™

SYSTEM®*
GENERAL
TinyBoost®
TinyBuck®
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TranSiC™
TriFault Detect™
TRUECURRENT®*
µSerDes™

UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
VoltagePlus™
XST™

*Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

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. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

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 here in:

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, and (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 a significant injury of the user.
2. A critical component in 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.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.Fairchildsemi.com, under Sales Support. Counterfeiting of semiconductor parts is a growing problem in the industry. All manufactures of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed application, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address and warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.



element14

EN - For pricing and availability in your local country please visit one of the below links:

DE - Informationen zu Preisen und Verfügbarkeit in Ihrem Land erhalten Sie über die unten aufgeführten Links:

FR - Pour connaître les tarifs et la disponibilité dans votre pays, cliquez sur l'un des liens suivants:

[FDD3670](#)

EN
This Datasheet is presented by
the manufacturer

DE
Dieses Datenblatt wird vom
Hersteller bereitgestellt

FR
Cette fiche technique est
présentée par le fabricant