

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



FDP7030BL/FDB7030BL

N-Channel Logic Level PowerTrench^O MOSFET

General Description

This N-Channel Logic Level 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 $R_{\text{DS(ON)}}\text{specifications}.$

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.

It has been optimized for low gate charge, low $R_{\text{DS}(\text{ON})}$ and fast switching speed.

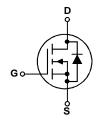
Features

- 60 A, 30 V $R_{DS(ON)} = 9 \text{ m}\Omega$ @ $V_{GS} = 10 \text{ V}$ $R_{DS(ON)} = 12 \text{ m}\Omega$ @ $V_{GS} = 4.5 \text{ V}$
- Critical DC electrical parameters specified at elevated temperature
- High performance trench technology for extremely low $R_{\mbox{\scriptsize DS}(\mbox{\scriptsize ON})}$
- 175°C maximum junction temperature rating



Absolute Maximum Ratings





TO-220 S TO-263AB FDP Series FDB Series

Symbol	Parameter		Ratings	Units	
V _{DSS}	Drain-Source Voltage		30	V	
V _{GSS}	Gate-Source Voltage		± 20	V	
I _D	Drain Current - Continuous	(Note 1)	60	А	
	- Pulsed	(Note 1)	180		
P _D	Total Power Dissipation @ T _C = 25°C Derate above 25°C		60	W	
			0.4	W/°C	
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-65 to +175	°C	

T_A=25°C unless otherwise noted

Thermal Characteristics

R _{θJC}	Thermal Resistance, Junction-to-Case	2.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDB7030BL	FDB7030BL	13"	24mm	800 units
FDP7030BL	FDP7030BL	Tube	n/a	45

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Drain-Sc	ource Avalanche Ratings (Note	1)		•		•
W _{DSS}	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 15 \text{ V}, \qquad I_{D} = 60 \text{ A}$			73	mJ
I _{AR}	Maximum Drain-Source Avalanche Current				60	Α
Off Char	acteristics		<u> </u>	ı	l .	I
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, \qquad I_{D} = 250 \mu\text{A}$	30			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		22		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24 \text{ V}, \qquad V_{GS} = 0 \text{ V}$			1	μΑ
I _{GSS}	Gate-Body Leakage	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			± 100	nA
On Char	acteristics (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250 \mu A$	1	1.9	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		-5		mV/°C
R _{DS(on)}	Static Drain–Source On– Resistance	$V_{GS} = 10 \text{ V}, \qquad I_D = 30 \text{ A}$ $V_{GS} = 4.5 \text{ V}, \qquad I_D = 25 \text{ A}$ $V_{GS} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 125^{\circ}\text{C}$		6.8 8.5 10.1	9 12 18	mΩ
I _{D(on)}	On-State Drain Current	$V_{GS} = 10 \text{ V}, \qquad V_{DS} = 10 \text{ V}$	30			Α
g FS	Forward Transconductance	$V_{DS} = 10V$, $I_{D} = 30 \text{ A}$		85		S
	Characteristics	1		l.		I
C _{iss}	Input Capacitance	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V},$		1760		pF
Coss	Output Capacitance	f = 1.0 MHz		440		pF
C _{rss}	Reverse Transfer Capacitance	1		185		pF
R _G	Gate Resistance	V _{GS} = 15 mV, f = 1.0 MHz		1.2		Ω
Switchin	g Characteristics (Note 2)		•	•		
t _{d(on)}	Turn-On Delay Time	$V_{DD} = 15V$, $I_{D} = 1 A$,		12	22	ns
t _r	Turn-On Rise Time	$V_{GS} = 10 \text{ V}, \qquad R_{GEN} = 6 \Omega$		12	22	ns
$t_{d(off)}$	Turn-Off Delay Time	1		30	48	ns
t _f	Turn-Off Fall Time			19	33	ns
Q _g	Total Gate Charge	$V_{DS} = 15 \text{ V}, \qquad I_{D} = 30 \text{ A},$		17	24	nC
Q _{gs}	Gate-Source Charge	$V_{GS} = 5 V$		5.4		nC
Q_{gd}	Gate-Drain Charge	1		6.4		nC
	ource Diode Characteristics	and Maximum Ratings		•		
I _s	Maximum Continuous Drain–Source				60	Α
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 30 A (Note 1)		0.92	1.3	V
t _{rr}	Diode Reverse Recovery Time	I _F = 30 A,			30	nS
Q _{rr}	Diode Reverse Recovery Charge	$d_{iF}/d_t = 100 \text{ A/}\mu\text{s}$			20	nC

Notes

^{1.} Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

Typical Characteristics

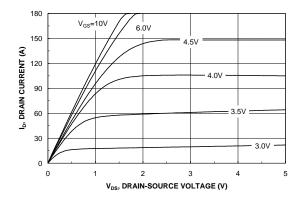


Figure 1. On-Region Characteristics.

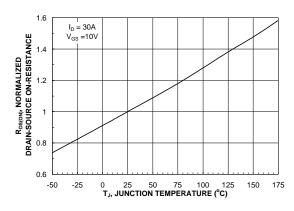


Figure 3. On-Resistance Variation with Temperature.

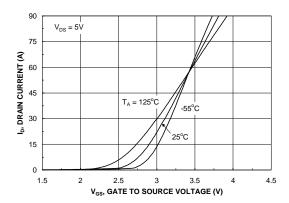


Figure 5. Transfer Characteristics.

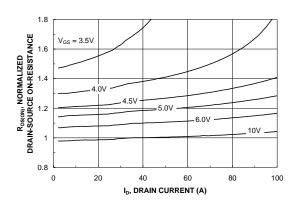


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

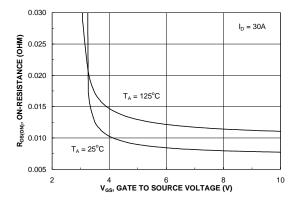


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

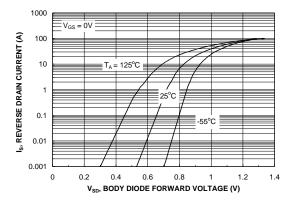
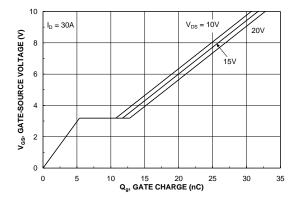


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics



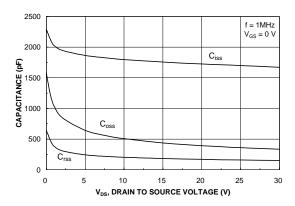
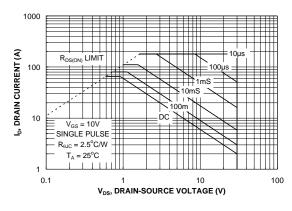


Figure 7. Gate Charge Characteristics.





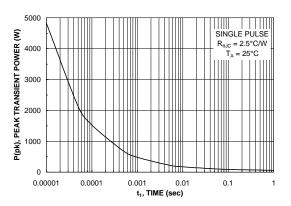


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

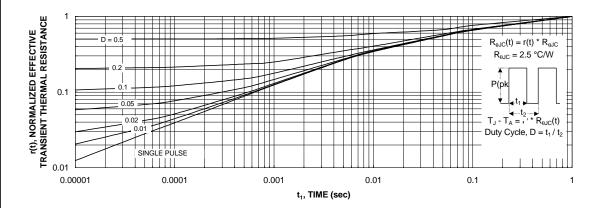


Figure 11. Transient Thermal Response Curve.

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.

FACT Quiet Series™ LittleFET™ ACEx™ Power247™ SuperSOT™-6 MICROCOUPLER™ PowerTrench® ActiveArray™ SuperSOT™-8 FAST® Bottomless™ MicroFET™ **OFET®** SvncFET™ FASTr™ CoolFET™ QSTM TinyLogic[®] $\mathsf{FRFET}^\mathsf{TM}$ MicroPak™ CROSSVOLT™ MICROWIRE™ QT Optoelectronics™ TINYOPTO™ GlobalOptoisolator™ TruTranslation™ DOME™ GTO™ Quiet Series™ MSX™ UHC™ EcoSPARK™ RapidConfigure™ HiSeC™ MSXPro™ UltraFET® E²CMOSTM I2CTM OCX^{TM} RapidConnect™ EnSigna™ SILENT SWITCHER® VCX^{TM} ImpliedDisconnect[™] OCXPro[™] FACT™ OPTOLOGIC® SMART START™ ISOPLANAR™ SPM™ Across the board. Around the world. $^{\text{TM}}$ OPTOPLANAR $^{\text{TM}}$ Stealth™ PACMAN™ The Power Franchise™ РОРТМ SuperSOT™-3

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

Programmable Active Droop™

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.

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 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 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 exp

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