

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



FDMC3020DC

July 2015

N-Channel Dual Cool TM 33 PowerTrench $^{\! @}$ MOSFET 30 V, 40 A, 6.25 ${\rm m}\Omega$

Features

- Dual CoolTM Top Side Cooling PQFN package
- Max $r_{DS(on)}$ = 6.25 m Ω at V_{GS} = 10 V, I_D = 12 A
- Max $r_{DS(on)}$ = 9.0 m Ω at V_{GS} = 4.5 V, I_D = 10 A
- High performance technology for extremely low r_{DS(on)}
- RoHS Compliant

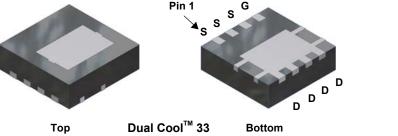
General Description

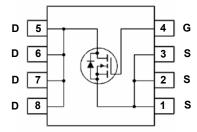
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process. Advancements in both silicon and Dual Cool TM package technologies have been combined to offer the lowest $r_{\text{DS(on)}}$ while maintaining excellent switching performance by extremely low Junction-to-Ambient thermal resistance.

Applications

- Synchronous Rectifier for DC/DC Converters
- Telecom Secondary Side Rectification
- High End Server/Workstation







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			±20	V
	Drain Current -Continuous (Package limited)	T _C = 25 °C		40	
	-Continuous (Silicon limited) T _C =			70	Α
ID	-Continuous	T _A = 25 °C	(Note 1a)	17	^
	-Pulsed			100	
E _{AS}	Single Pulse Avalanche Energy		(Note 3)	60	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 4)	1.6	V/ns
D	Power Dissipation	T _C = 25 °C		50	W
P_{D}	Power Dissipation	T _A = 25 °C	(Note 1a)	3.0	VV
T _J , T _{STG}	Operating and Storage Junction Temperature R	ange		-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Top Source)	7.9	
$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Bottom Drain)	2.5	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	42	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	105	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1i)	17	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1j)	26	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1k)	12	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
3020	FDMC3020DC	Dual Cool TM 33	13"	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Chara	cteristics					
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		17		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 24 V, V _{GS} = 0 V			1	μΑ
I _{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			±100	nA

On Characteristics

V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	1.0	1.9	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		-6		mV/°C
		V _{GS} = 10 V, I _D = 12 A		5.0	6.25	
r _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 4.5 \text{ V}, I_D = 10 \text{ A}$		7.2	9.0	mΩ
		V _{GS} = 10 V, I _D = 12 A, T _J = 125 °C		7.5	9.1	
9 _{FS}	Forward Transconductance	V _{DS} = 5 V, I _D = 12 A		44		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V - 15 V V - 0 V		1038	1385	pF
C _{oss}	Output Capacitance	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		513	685	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1 1/11 12		87	135	pF
R_g	Gate Resistance		0.1	0.9	2.0	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time		9	18	ns
t _r	Rise Time	V _{DD} = 15 V, I _D = 12 A,	3	10	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 10 V, R_{GEN} = 6 Ω	19	35	ns
t _f	Fall Time		2	10	ns
Qg	Total Gate Charge	V _{GS} = 0 V to 10 V	15.5	23	nC
Qg	Total Gate Charge	$V_{GS} = 0 \text{ V to } 4.5 \text{ V}$ $V_{DD} = 15 \text{ V}$	7.1	10.6	nC
Q _{gs}	Gate to Source Gate Charge	I _D = 12 A	3		nC
Q_{gd}	Gate to Drain "Miller" Charge		2.5		nC

Drain-Source Diode Characteristics

V _{SD} Source to Drain Diode	Source to Drain Diede, Fenuerd Voltage	V _{GS} = 0 V, I _S = 12 A (Note 2)		0.82	1.3	\/
	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 1.9 \text{ A}$ (Note 2)		0.73	1.2	V
t _{rr}	Reverse Recovery Time	I _E = 12 A. di/dt = 100 A/μs		25	45	ns
Q _{rr}	Reverse Recovery Charge	I _F = 12 A, αι/αι = 100 A/μs		9	18	nC

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Top Source)	7.9	
$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Bottom Drain)	2.5	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	42	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	105	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1c)	29	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1d)	40	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1e)	19	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1f)	23	C/VV
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1g)	30	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1h)	79	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1i)	17	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1j)	26	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1k)	12	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1I)	16	

NOTES:

1. R_{0,IA} is determined with the device mounted on a FR-4 board using a specified pad of 2 oz copper as shown below. R_{0,IC} is guaranteed by design while R_{0,CA} is determined by the user's board design.



a. 42 °C/W when mounted on a 1 in² pad of 2 oz copper



b. 105 °C/W when mounted on a minimum pad of 2 oz copper

- c. Still air, 20.9x10.4x12.7mm Aluminum Heat Sink, 1 in^2 pad of 2 oz copper
- d. Still air, 20.9x10.4x12.7mm Aluminum Heat Sink, minimum pad of 2 oz copper
- e. Still air, 45.2x41.4x11.7mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, 1 in 2 pad of 2 oz copper
- $f. \ Still \ air, \ 45.2x41.4x11.7mm \ Aavid \ Thermalloy \ Part \# \ 10-L41B-11 \ Heat \ Sink, \ minimum \ pad \ of \ 2 \ oz \ copper \ and \ Copper \ air \ Advides \ Advides$
- g. 200FPM Airflow, No Heat Sink,1 in² pad of 2 oz copper
- h. 200FPM Airflow, No Heat Sink, minimum pad of 2 oz copper
- i. 200FPM Airflow, 20.9x10.4x12.7mm Aluminum Heat Sink, 1 in 2 pad of 2 oz copper
- j. 200FPM Airflow, 20.9x10.4x12.7mm Aluminum Heat Sink, minimum pad of 2 oz copper
- k. 200FPM Airflow, 45.2x41.4x11.7mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, 1 in² pad of 2 oz copper
- I. 200FPM Airflow, 45.2x41.4x11.7mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, minimum pad of 2 oz copper
- 2. Pulse Test: Pulse Width < 300 μ s, Duty cycle < 2.0%.
- 3. E_{AS} of 60 mJ is based on starting T_J = 25 °C, L = 1 mH, I_{AS} = 11 A, V_{DD} = 27 V, V_{GS} = 10 V.
- 4. $I_{SD} \leq$ 12 A, di/dt \leq 100 A/ μ s, $V_{DD} \leq$ BV $_{DSS}$, Starting T $_{J}$ = 25 o C.

Typical Characteristics T_J = 25°C unless otherwise noted

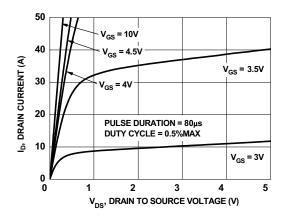


Figure 1. On-Region Characteristics

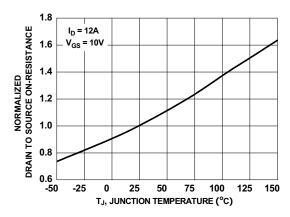


Figure 3. Normalized On-Resistance vs Junction Temperature

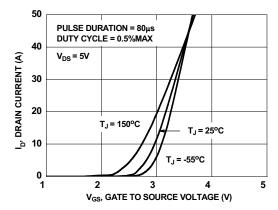


Figure 5. Transfer Characteristics

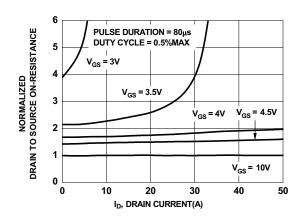


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

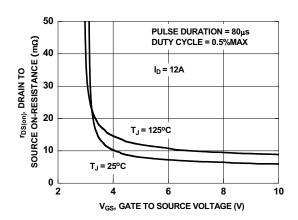


Figure 4. On-Resistance vs Gate to Source Voltage

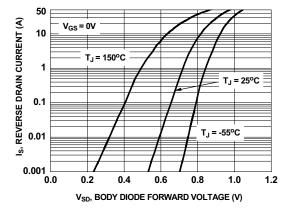


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^{\circ}C$ unless otherwise noted

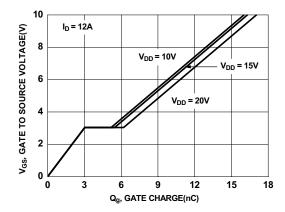


Figure 7. Gate Charge Characteristics

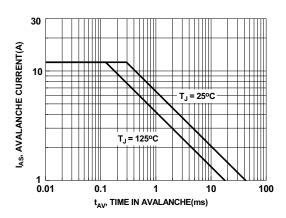


Figure 9. Unclamped Inductive Switching Capability

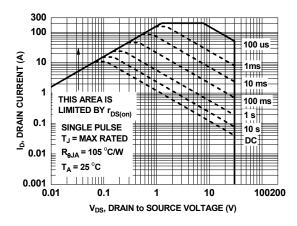


Figure 11. Forward Bias Safe Operating Area

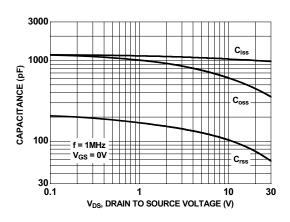


Figure 8. Capacitance vs Drain to Source Voltage

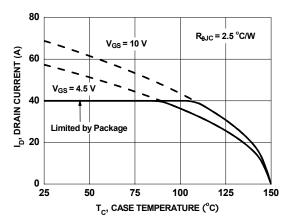


Figure 10. Maximum Continuous Drain Current vs Case Temperature

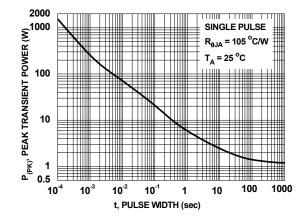


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

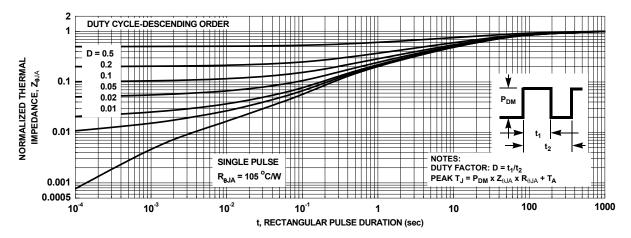
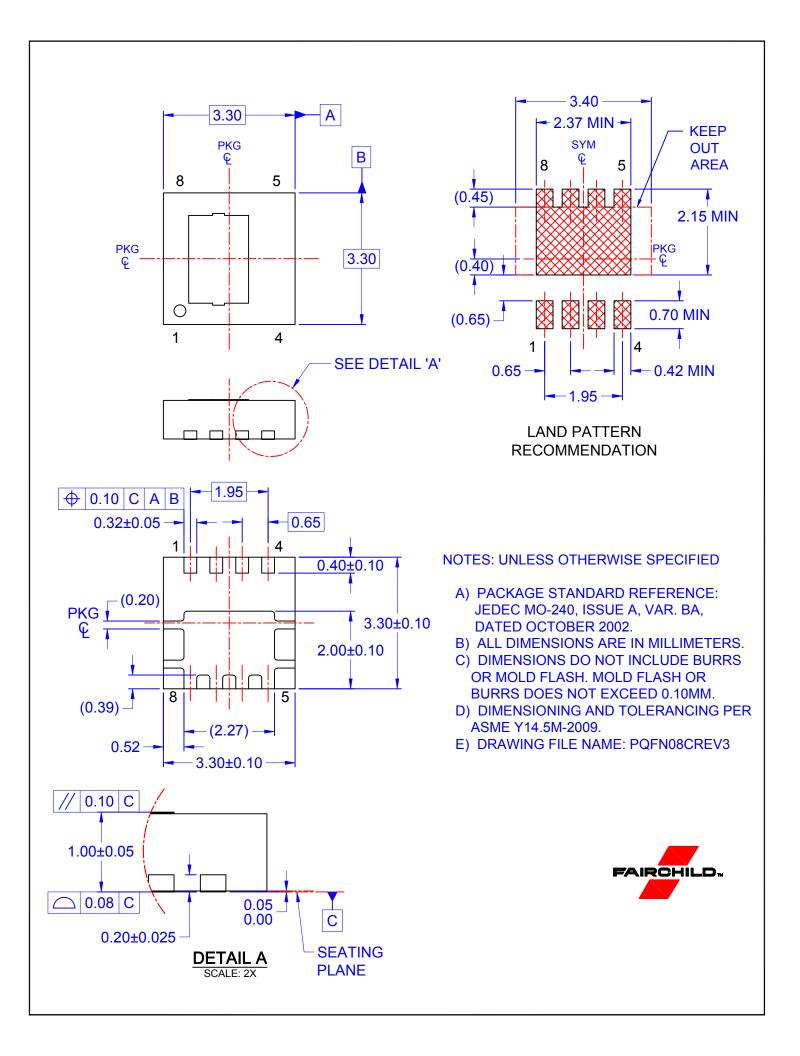


Figure 13. Junction-to-Ambient Transient Thermal Response Curve



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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

ON Semiconductor: FDMC3020DC

ПОСТАВКА ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru_6 moschip.ru_4 moschip.ru_9