

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



April 2014

FDPC8014S

PowerTrench® Power Clip 25V Asymmetric Dual N-Channel MOSFET

Features

Q1: N-Channel

- \blacksquare Max $r_{DS(on)}$ = 3.8 m Ω at V_{GS} = 10 V, I_{D} = 20 A
- Max $r_{DS(on)} = 4.7 \text{ m}\Omega$ at $V_{GS} = 4.5 \text{ V}$, $I_D = 18 \text{ A}$

Q2: N-Channel

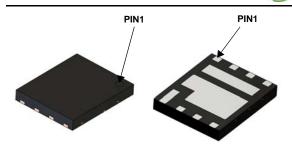
- Max $r_{DS(on)} = 1.2 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 41 \text{ A}$
- Max $r_{DS(on)}$ = 1.4 m Ω at V_{GS} = 4.5 V, I_D = 37 A
- Low inductance packaging shortens rise/fall times, resulting in lower switching losses
- MOSFET integration enables optimum layout for lower circuit inductance and reduced switch node ringing
- RoHS Compliant

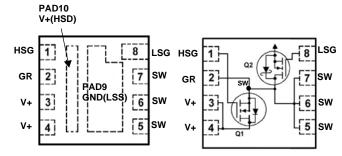
General Description

This device includes two specialized N-Channel MOSFETs in a dual package. The switch node has been internally connected to enable easy placement and routing of synchronous buck converters. The control MOSFET (Q1) and synchronous SyncFETTM (Q2) have been designed to provide optimal power efficiency.

Applications

- Computing
- Communications
- General Purpose Point of Load





Top	Power Clip 5X6	Bottom

Pin	Name	Description	Pin	Name	Description	Pin	Name	Description
1	HSG	High Side Gate	3,4,10	V+(HSD)	High Side Drain	8	LSG	Low Side Gate
2	GR	Gate Return	5,6,7	SW	Switching Node, Low Side Drain	9	GND(LSS)	Low Side Source

MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter		Q1	Q2	Units
V_{DS}	Drain to Source Voltage		25 ^{Note5}	25	V
V_{GS}	Gate to Source Voltage		±12	±12	V
	Drain Current -Continuous	T _C = 25 °C	60	110	
I_D	-Continuous	T _A = 25 °C	20 ^{Note1a}	41 ^{Note1b}	Α
	-Pulsed	T _A = 25 °C (Note 4)	75	160	
E _{AS}	Single Pulse Avalanche Energy	(Note 3)	73	253	mJ
E _{AS}	Power Dissipation for Single Operation	T _C = 25 °C	21	42	W
	Power Dissipation for Single Operation	T _A = 25 °C	2.1 ^{Note1a}	2.3 Note1b	VV
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-55 to	+150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	6.0	3.0	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	60 ^{Note1a}	55 ^{Note1b}	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	130 ^{Note1c}	120 ^{Note1d}	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
05OD/16OD	FDPC8014S	Power Clip 56	13 "	12 mm	3000 units

Electrical Characteristics $T_J = 25$ °C unless otherwise noted

Symbol	Parameter	Test Conditions	Туре	Min	Тур	Max	Units
Off Chara	acteristics						
D\/	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	Q1	25			V
DVDSS		$I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}$	Q2	25			V
ΔBV_{DSS}	Breakdown Voltage Temperature	I _D = 250 μA, referenced to 25 °C	Q1		24		mV/°C
ΔT_{J}	Coefficient	I_D = 10 mA, referenced to 25 °C	Q2		24		IIIV/ C
ı	Zoro Coto Voltago Proin Current	V _{DS} = 20 V, V _{GS} = 0 V	Q1			1	μΑ
IDSS	Zero Gate Voltage Drain Current	$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}$	Q2			500	μΑ
1	Gate to Source Leakage Current,	V _{GS} = 12 V/-8 V, V _{DS} = 0 V	Q1			±100	nA
I _{GSS}	Forward	$V_{GS} = 12 \text{ V/-8 V}, V_{DS} = 0 \text{ V}$	Q2			±100	nA

On Characteristics

V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$ $V_{GS} = V_{DS}, I_D = 1 mA$	Q1 Q2	0.8 1.1	1.3 1.4	2.5 2.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_{.I}}$	Gate to Source Threshold Voltage	I_D = 250 μ A, referenced to 25 °C	Q1		-4		mV/°C
ΔT_{J}	Temperature Coefficient	I _D = 10 mA, referenced to 25 °C	Q2		-3		11117
	Drain to Source On Resistance	V _{GS} = 10V, I _D = 20 A			2.8	3.8	
		$V_{GS} = 4.5 \text{ V}, I_D = 18 \text{ A}$	Q1		3.4	4.7	
r		$V_{GS} = 10 \text{ V}, I_{D} = 20 \text{ A}, T_{J} = 125 \text{ °C}$			3.9	5.3	mΩ
r _{DS(on)}		$V_{GS} = 10V, I_D = 41 A$			0.9	1.2	11122
		$V_{GS} = 4.5 \text{ V}, I_D = 37 \text{ A}$	Q2		1.0	1.4	
		$V_{GS} = 10 \text{ V}, I_D = 41 \text{ A}, T_J = 125 ^{\circ}\text{C}$			1.1	1.5	
9 _{FS}	Forward Transconductance	$V_{DS} = 5 \text{ V}, I_{D} = 20 \text{ A}$	Q1		182		S
	Forward Transconductance	$V_{DS} = 5 \text{ V}, I_{D} = 41 \text{ A}$	Q2		315		3

Dynamic Characteristics

-							
C _{iss}	Input Capacitance	Q1:	Q1 Q2		1695 6580	2375 9870	pF
C _{oss}	Output Capacitance	$V_{DS} = 13 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHZ}$ $Q2:$	Q1 Q2		495 1720	710 2580	pF
C _{rss}	Reverse Transfer Capacitance	$V_{DS} = 13 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHZ}$	Q1 Q2		54 204	100 370	pF
R _g	Gate Resistance		Q1 Q2	0.1 0.1	0.4 0.4	1.2 1.2	Ω

Switching Characteristics

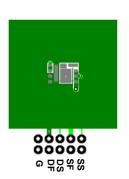
t _{d(on)}	Turn-On Delay Time		Q1 Q2	8 16	16 28	ns
t _r	Rise Time	Q1: V _{DD} = 13 V, I _D = 20 A, R _{GEN} = 6	Ω1 Q2	2 6	10 11	ns
t _{d(off)}	Turn-Off Delay Time	Q2: V _{DD} = 13 V, I _D = 41 A, R _{GEN} = 6	Q1 Q2	24 47	38 75	ns
t _f	Fall Time	VDD = 10 V, 10 = 417, NGEN = 0.	Q1 Q2	2 4	10 10	ns
Q _g	Total Gate Charge	V _{GS} = 0 V to 10 V	Q1 Q2	25 93	35 130	nC
Qg	Total Gate Charge	$V_{GS} = 0 \text{ V to } 4.5 \text{ V}$ $V_{DD} = 13 \text{ V, I}$ $= 20 \text{ A}$	Q1 Q2	11 43	16 60	nC
Q _{gs}	Gate to Source Gate Charge	Q2 V _{DD} = 13 V, I	Q1 D Q2	3.4 13		nC
Q _{gd}	Gate to Drain "Miller" Charge	= 41 A	Q1 Q2	2.2 8.5		nC

Electrical Characteristics T_J = 25 °C unless otherwise noted

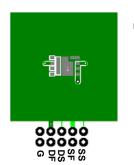
Symbol	Parameter	Test Conditions	Type	Min	Тур	Max	Units
Drain-Soເ	rce Diode Characteristics						
V _{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V, } I_S = 20 \text{ A}$ (Note 2) $V_{GS} = 0 \text{ V, } I_S = 41 \text{ A}$ (Note 2)	Q1 Q2		0.8 0.8	1.2 1.2	V
I _S	Diode continuous forward current	T _ 25 °C	Q1 Q2		60 110		А
I _{S,Pulse}	Diode pulse current	-T _C = 25 °C	Q1 Q2		75 160		А
t _{rr}	Reverse Recovery Time	Q1 I _F = 20 A, di/dt = 100 A/μs	Q1 Q2		25 36	40 58	ns
Q _{rr}	Reverse Recovery Charge	Q2 $I_F = 41 \text{ A, di/dt} = 300 \text{ A/}\mu\text{s}$	Q1 Q2		10 47	20 75	nC

Notes

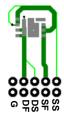
 $1.R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



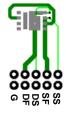
a. 60 °C/W when mounted on a 1 in² pad of 2 oz copper



b. 55 °C/W when mounted on a 1 in² pad of 2 oz copper



c. 130 °C/W when mounted on a minimum pad of 2 oz copper



d. 120 °C/W when mounted on a minimum pad of 2 oz copper

- 2 Pulse Test: Pulse Width < 300 $\mu\text{s},$ Duty cycle < 2.0%.
- 3. Q1 : E_{AS} of 73 mJ is based on starting T_J = 25 $^{\rm o}$ C; N-ch: L = 3 mH, I_{AS} = 7 A, V_{DD} = 30 V, V_{GS} = 10 V. 100% test at L= 0.1 mH, I_{AS} = 24 A. Q2: E_{AS} of 253 mJ is based on starting T_J = 25 $^{\rm o}$ C; N-ch: L = 3 mH, I_{AS} = 13 A, V_{DD} = 25 V, V_{GS} = 10 V. 100% test at L= 0.1 mH, I_{AS} = 43 A.
- 4. Pulsed Id limited by junction temperature,td<=10 us. Please refer to SOA curve for more details.
- 5. The continuous V_{DS} rating is 25 V; However, a pulse of 30 V peak voltage for no longer than 100 ns duration at 600 KHz frequency can be applied.

Typical Characteristics (Q1 N-Channel) T_J = 25°C unless otherwise noted

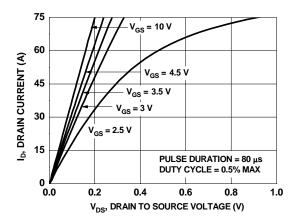


Figure 1. On Region Characteristics

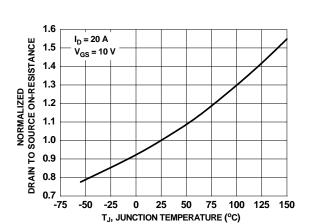


Figure 3. Normalized On Resistance vs. Junction Temperature

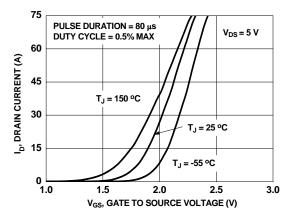


Figure 5. Transfer Characteristics

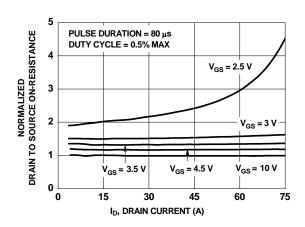


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

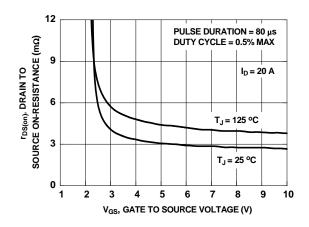


Figure 4. On-Resistance vs. Gate to Source Voltage

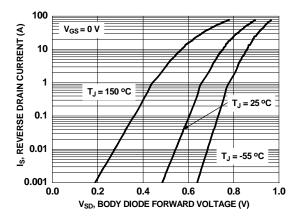


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics (Q1 N-Channel) T_J = 25°C unless otherwise noted

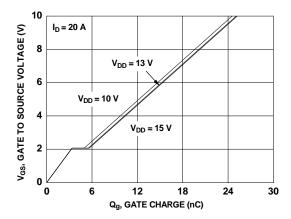


Figure 7. Gate Charge Characteristics

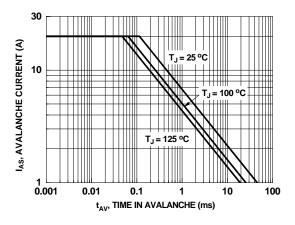


Figure 9. Unclamped Inductive Switching Capability

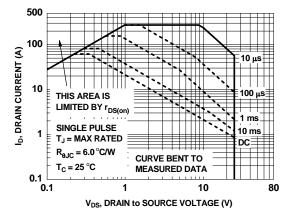


Figure 11. Forward Bias Safe Operating Area

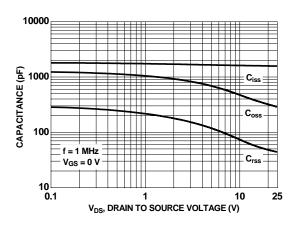


Figure 8. Capacitance vs. Drain to Source Voltage

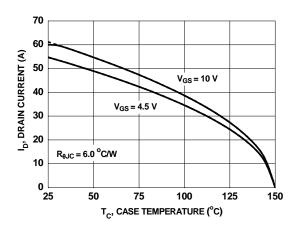


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

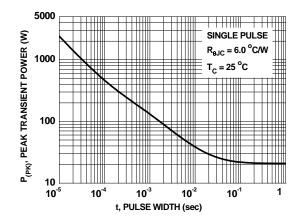


Figure 12. Single Pulse Maximum Power Dissipation

5

Typical Characteristics (Q1 N-Channel) $T_J = 25$ °C unless otherwise noted

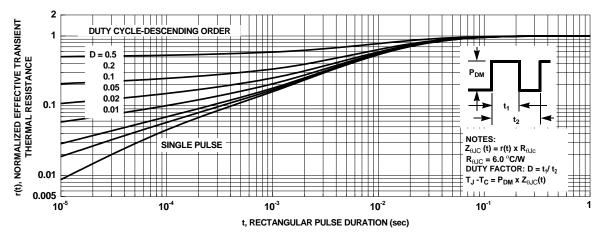


Figure 13. Junction-to-Case Transient Thermal Response Curve

Typical Characteristics (Q2 N-Channel) T_J = 25 °C unless otherwise noted

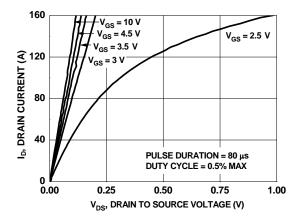


Figure 14. On- Region Characteristics

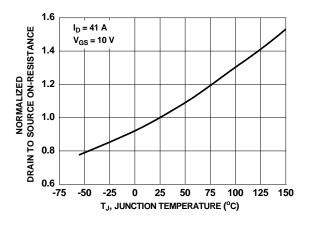


Figure 16. Normalized On-Resistance vs. Junction Temperature

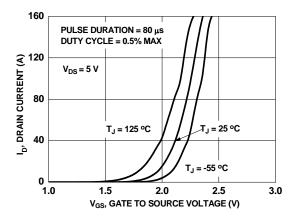


Figure 18. Transfer Characteristics

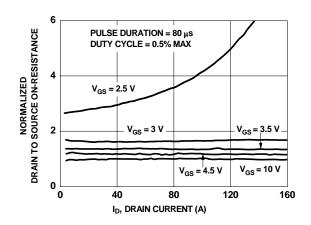


Figure 15. Normalized on-Resistance vs. Drain Current and Gate Voltage

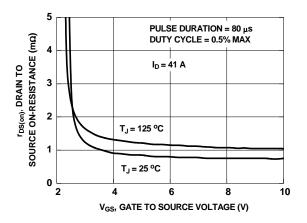


Figure 17. On-Resistance vs. Gate to Source Voltage

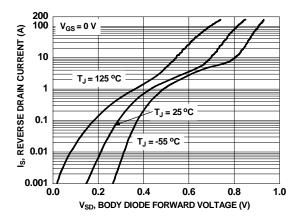


Figure 19. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics (Q2 N-Channel) T_J = 25°C unless otherwise noted

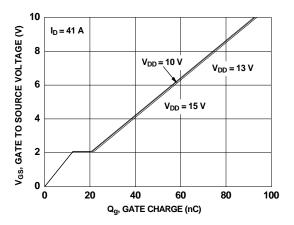


Figure 20. Gate Charge Characteristics

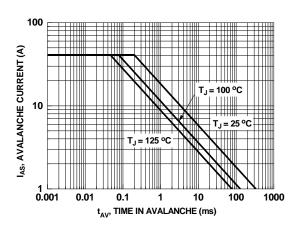


Figure 22. Unclamped Inductive Switching Capability

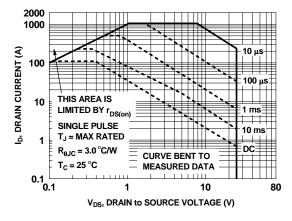


Figure 24. Forward Bias Safe Operating Area

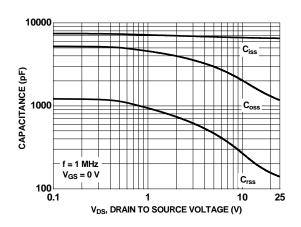


Figure 21. Capacitance vs. Drain to Source Voltage

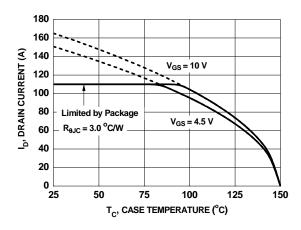


Figure 23. Maximum Continuous Drain Current vs. Case Temperature

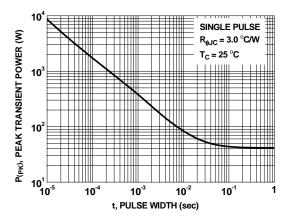


Figure 25. Single Pulse Maximum Power Dissipation

Typical Characteristics (Q2 N-Channel) $T_J = 25$ °C unless otherwise noted

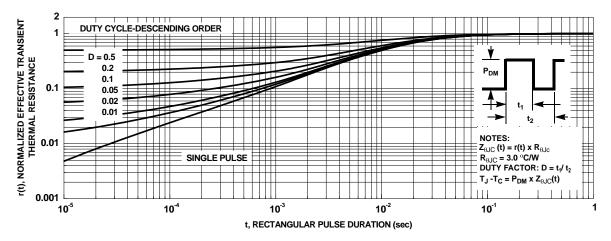


Figure 26. Junction-to-Case Transient Thermal Response Curve

Typical Characteristics (continued)

SyncFETTM Schottky body diode Characteristics

Fairchild's SyncFETTM process embeds a Schottky diode in parallel with PowerTrench[®] MOSFET. This diode exhibits similar characteristics to a discrete external Schottky diode in parallel with a MOSFET. Figure 27 shows the reverses recovery characteristic of the FDPC8014S.

Schottky barrier diodes exhibit significant leakage at high temperature and high reverse voltage. This will increase the power in the device.

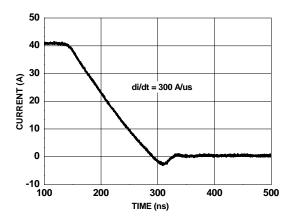


Figure 27. FDPC8014S SyncFETTM Body Diode Reverse Recovery Characteristic

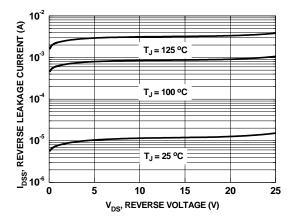
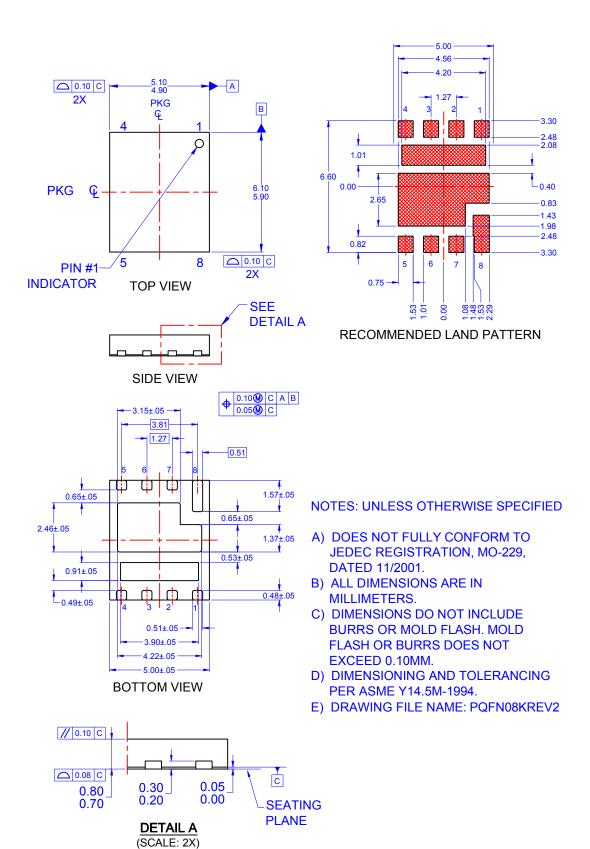


Figure 28. SyncFETTM Body Diode Reverse Leakage vs. Drain-source Voltage



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: FDPC8014S

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