

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



January 2014

FDMC7660S

N-Channel Power Trench[®] SyncFETTM 30 V, 20 A, 2.2 m Ω

Features

- Max $r_{DS(on)} = 2.2 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 20 \text{ A}$
- Max $r_{DS(on)}$ = 2.95 m Ω at V_{GS} = 4.5 V, I_D = 18 A
- High performance technology for extremely low r_{DS(on)}
- Termination is Lead-free and RoHS Compliant

General Description

The FDMC7660S has been designed to minimize losses in power conversion applications. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ while maintaining excellent switching performance. This device has the added benefit of an efficient monolithic Schottky body diode.

Applications

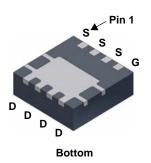
- Synchronous Rectifier for DC/DC Converters
- Notebook Vcore/GPU low side switch
- Networking Point of Load low side switch
- Telecom secondary side rectification

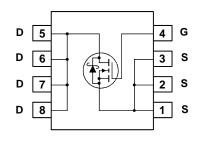




Top







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 | | (Note 4) | ±20 | V |
| | Drain Current -Continuous (Package limited) | T _C = 25 °C | | 40 | |
| | -Continuous (Silicon limited) | T _C = 25 °C | | 100 | A |
| ID | -Continuous | T _A = 25 °C | (Note 1a) | 20 | - A |
| | -Pulsed | | | 200 | |
| E _{AS} | Single Pulse Avalanche Energy | Single Pulse Avalanche Energy (Note 3) | | 128 | mJ |
| В | Power Dissipation | | | 41 | W |
| P_{D} | Power Dissipation | | (Note 1a) | 2.3 | 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 | | 3 | °C/W |
|-------------------|---|-----------|----|------|
| R _{e,IA} | Thermal Resistance, Junction to Ambient | (Note 1a) | 53 | C/VV |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|-----------|---------------|-----------|------------|------------|
| FDMC7660S | FDMC7660S | Power 33 13 " | | 12 mm | 3000 units |

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

| Symbol | Parameter | Test Conditions | Min | Тур | Max | Units |
|--|--|---|-----|-----|-----|-------|
| Off Chara | acteristics | | | | | |
| BV_DSS | Drain to Source Breakdown Voltage | $I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}$ | 30 | | | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_{J}}$ | Breakdown Voltage Temperature Coefficient | I _D = 1 mA, referenced to 25 °C | | 13 | | mV/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 24 V, V _{GS} = 0 V | | | 500 | μΑ |
| I_{GSS} | Gate to Source Leakage Current | $V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$ | | | 100 | nA |

On Characteristics

| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 1 \text{ mA}$ | 1.2 | 1.6 | 2.5 | V |
|--|--|---|-----|-----|------|-------|
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | I _D = 1 mA, referenced to 25 °C | | -3 | | mV/°C |
| | | $V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$ | | 1.7 | 2.2 | |
| r _{DS(on)} | Static Drain to Source On Resistance | $V_{GS} = 4.5 \text{ V}, I_D = 18 \text{ A}$ | | 2.5 | 2.95 | mΩ |
| , , | | $V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}, T_J = 125 \text{ °C}$ | | 2.2 | 3.1 | |
| 9 _{FS} | Forward Transconductance | $V_{DD} = 5 \text{ V}, I_{D} = 20 \text{ A}$ | | 129 | | S |

Dynamic Characteristics

| C _{iss} | Input Capacitance | V 45.V.V 0.V | | 3250 | 4325 | pF |
|------------------|------------------------------|--|-----|------|------|----|
| Coss | Output Capacitance | $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1 MHz | | 1260 | 1680 | pF |
| C _{rss} | Reverse Transfer Capacitance | 1 - 1 1011 12 | | 105 | 160 | pF |
| R_{q} | Gate Resistance | | 0.1 | 0.8 | 1.6 | Ω |

Switching Characteristics

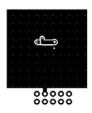
| t _{d(on)} | Turn-On Delay Time | | | 14 | 25 | ns |
|---------------------|-------------------------------|--|----------|-----|----|----|
| t _r | Rise Time | V _{DD} = 15 V, I _D = 20 A, | | 5 | 10 | ns |
| t _{d(off)} | Turn-Off Delay Time | $V_{GS} = 10 \text{ V}, R_{GEN} = 6 \Omega$ | | 34 | 54 | ns |
| t _f | Fall Time | | | 3.9 | 10 | ns |
| 0 | Total Gate Charge | V _{GS} = 0 V to 10 V | | 47 | 66 | nC |
| $Q_{g(TOT)}$ | Total Gate Charge | $V_{GS} = 0 \text{ V to } 4.5 \text{ V}$ $V_{DD} = 15 \text{ V}$ | V | 21 | 29 | nC |
| Q_{gs} | Total Gate Charge | I _D = 20 A | | 9.5 | | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | | 5 | | nC |

Drain-Source Diode Characteristics

| V | V _{SD} Source to Drain Diode Forward Voltage | $V_{GS} = 0 \text{ V}, I_{S} = 20 \text{ A}$ | (Note 2) | 8.0 | 1.2 | V |
|-----------------|---|---|----------|-----|-----|----|
| V SD | | $V_{GS} = 0 \text{ V}, I_{S} = 1.9 \text{ A}$ | (Note 2) | 0.4 | 0.7 | |
| t _{rr} | Reverse Recovery Time | -I _F = 20 A, di/dt = 300 A/μs | | 31 | 50 | ns |
| Q _{rr} | Reverse Recovery Charge | | | 39 | 62 | nC |

NOTES

^{1.} R_{0,1A} is determined with the device mounted on a 1in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. R_{0,1C} is guaranteed by design while R_{0,1C} is determined by the user's board design.



a. 53°C/W when mounted on a 1 in² pad of 2 oz copper



b. 125°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. Starting $T_J = 25^{\circ}C$; N-ch: L = 1 mH, $I_{AS} = 16$ A, $V_{DD} = 27$ V, $V_{GS} = 10$ V.
- 4. As an N-ch device, the negative Vgs rating is for low duty cycle pulse ocurrence only. No continuous rating is implied.

Typical Characteristics T_J = 25 °C unless otherwise noted

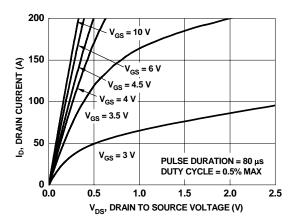


Figure 1. On-Region Characteristics

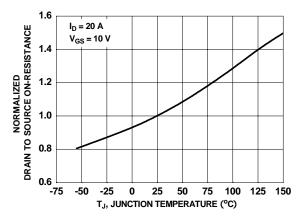


Figure 3. Normalized On-Resistance vs Junction Temperature

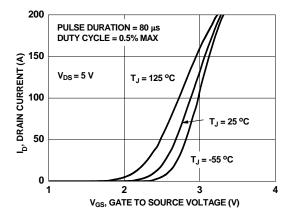


Figure 5. Transfer Characteristics

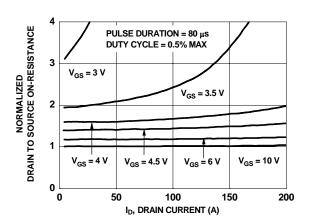


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

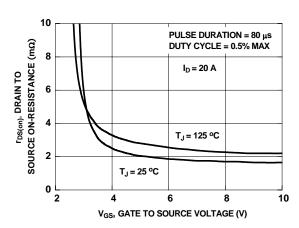


Figure 4. On-Resistance vs Gate to Source Voltage

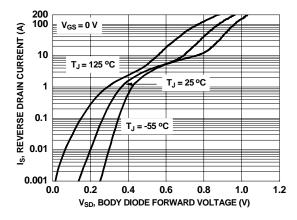


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

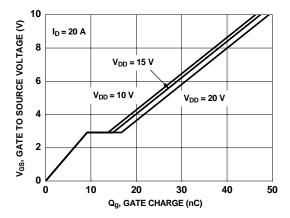


Figure 7. Gate Charge Characteristics

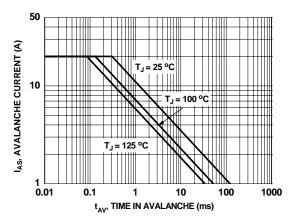


Figure 9. Unclamped Inductive Switching Capability

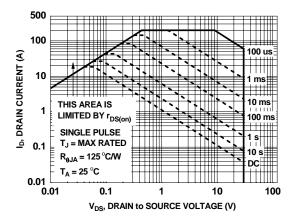


Figure 11. Forward Bias Safe Operating Area

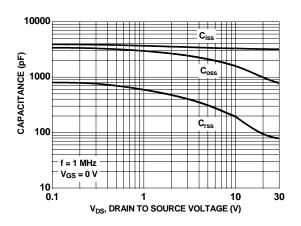


Figure 8. Capacitance vs Drain to Source Voltage

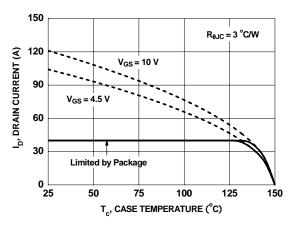


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

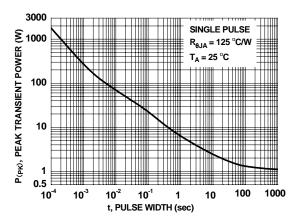


Figure 12. Single Pulse Maximum Power Dissipation

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

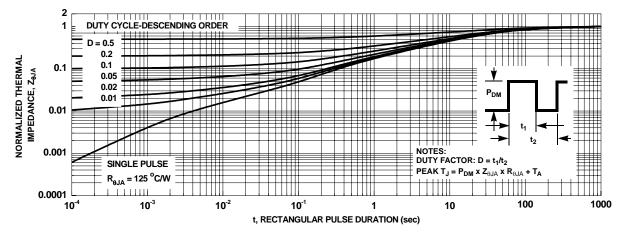


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

Typical Characteristics (continued)

SyncFET Schottky body diode Characteristics

Fairchild's SyncFET 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 reverse recovery characteristic of the FDMC7660S.

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

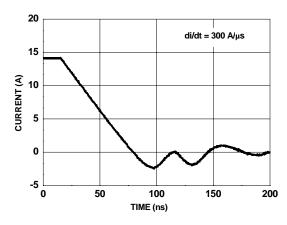


Figure 14. FDMC7660S SyncFET body diode reverse recovery characteristic

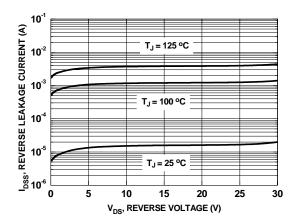


Figure 15. SyncFET body diode reverse leakage versus drain-source voltage

Dimensional Outline and Pad Layout $-3.30\pm0.10-$ 2.37 MIN PKG SYM Œ -(0.45) 8 5 2.15 MIN (0.40)PKG Q-PKGQ 3.30 ± 0.10 (0.65) \bigcirc 0.70 MIN 4 -0.42 MIN 0.65 SEE DETAIL A -1.95 LAND PATTERN RECOMMENDATION 1.95 0.65 0.32±0.05-◆ 0.10 C A B -0.40 ± 0.10 (0.20)PKGQ 2.00 ± 0.10

NOTES: UNLESS OTHERWISE SPECIFIED

- A) PACKAGE STANDARD REFERENCE:

 JEDEC MO-240, ISSUE A, VAR. BA,

 DATED OCTOBER 2002.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
- E) DRAWING FILE NAME: PQFN08BREV1

(2.27) -

 $(0.39)^{\frac{1}{2}}$

(0.52)

8





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® EfficentMax™ ESBC™

Fairchild®

Fairchild Semiconductor® FACT Quiet Series™ FACT[®]

FAST® FastvCore™ FETBench™ **FPSTM**

F-PFS™ FRFET®

Global Power ResourceSM GreenBridge™

Green FPS™ Green FPS™ e-Series™

Gmax™ $\mathsf{GTO^{\mathsf{TM}}}$ IntelliMAX™ ISOPLANAR™

Marking Small Speakers Sound Louder and Better™

MegaBuck™ MICROCOUPLER™ MicroFET™ MicroPak™ MicroPak2™ MillerDrive™ MotionMax™ mWSaver® OptoHiT™ OPTOLOGIC®

OPTOPLANAR®

PowerTrench® PowerXS™

 $(U)_{\mathbb{R}}$

Programmable Active Droop™ QFET'

QSTM 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 ®* TinyBoost[®] TinyBuck® TinyCalc™ TinyLogic[®] TINYOPTO™ TinyPower™ TinyPWM™ TinyWire™ TranSiC™ TriFault Detect™ TRUECURRENT®* μSerDes™

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

*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.

- 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.
- 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 handing 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. |

Rev. 166

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: FDMC7660S

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