

# FDG6316P

## P-Channel 1.8V Specified PowerTrench® MOSFET

### General Description

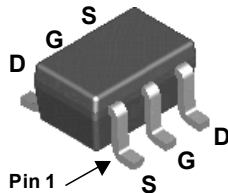
This P-Channel 1.8V specified MOSFET uses Fairchild's advanced low voltage PowerTrench process. It has been optimized for battery power management applications.

### Applications

- Battery management
- Load switch

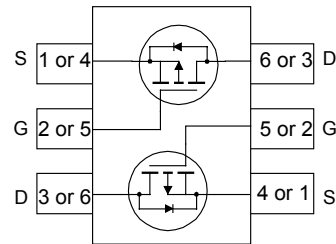
### Features

- $-0.7\text{ A}$ ,  $-12\text{ V}$ .  $R_{DS(ON)} = 270\text{ m}\Omega$  @  $V_{GS} = -4.5\text{ V}$   
 $R_{DS(ON)} = 360\text{ m}\Omega$  @  $V_{GS} = -2.5\text{ V}$   
 $R_{DS(ON)} = 650\text{ m}\Omega$  @  $V_{GS} = -1.8\text{ V}$
- Low gate charge
- High performance trench technology for extremely low  $R_{DS(ON)}$
- Compact industry standard SC70-6 surface mount package



**SC70-6**

The pinouts are symmetrical; pin 1 and pin 4 are interchangeable.



### Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter                                        | Ratings         | Units            |
|----------------|--------------------------------------------------|-----------------|------------------|
| $V_{DSS}$      | Drain-Source Voltage                             | $-12$           | V                |
| $V_{GSS}$      | Gate-Source Voltage                              | $\pm 8$         | V                |
| $I_D$          | Drain Current – Continuous (Note 1)              | $-0.7$          | A                |
|                | – Pulsed                                         | $-1.8$          |                  |
| $P_D$          | Power Dissipation for Single Operation (Note 1)  | $0.3$           | W                |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | $-55$ to $+150$ | $^\circ\text{C}$ |

### Thermal Characteristics

|                 |                                                  |       |                    |
|-----------------|--------------------------------------------------|-------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 1) | $415$ | $^\circ\text{C/W}$ |
|-----------------|--------------------------------------------------|-------|--------------------|

### Package Marking and Ordering Information

| Device Marking | Device   | Reel Size | Tape width | Quantity   |
|----------------|----------|-----------|------------|------------|
| .16            | FDG6316P | 7"        | 8mm        | 3000 units |

**Electrical Characteristics** $T_A = 25^\circ\text{C}$  unless otherwise noted

| Symbol                                                 | Parameter                                             | Test Conditions                                                                                                                                                                                                                         | Min  | Typ                      | Max                      | Units |
|--------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------|--------------------------|-------|
| Off Characteristics                                    |                                                       |                                                                                                                                                                                                                                         |      |                          |                          |       |
| BV <sub>DSS</sub>                                      | Drain–Source Breakdown Voltage                        | V <sub>GS</sub> = 0 V, I <sub>D</sub> = –250 μA                                                                                                                                                                                         | –12  |                          |                          | V     |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$                   | Breakdown Voltage Temperature Coefficient             | I <sub>D</sub> = –250 μA, Referenced to 25°C                                                                                                                                                                                            |      | –3.7                     |                          | mV/°C |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                       | V <sub>DS</sub> = –10 V, V <sub>GS</sub> = 0 V                                                                                                                                                                                          |      |                          | –1                       | μA    |
| I <sub>GSSF</sub>                                      | Gate–Body Leakage, Forward                            | V <sub>GS</sub> = –8 V, V <sub>DS</sub> = 0 V                                                                                                                                                                                           |      |                          | –100                     | nA    |
| I <sub>GSSR</sub>                                      | Gate–Body Leakage, Reverse                            | V <sub>GS</sub> = 8 V, V <sub>DS</sub> = 0 V                                                                                                                                                                                            |      |                          | 100                      | nA    |
| On Characteristics (Note 2)                            |                                                       |                                                                                                                                                                                                                                         |      |                          |                          |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = –250 μA                                                                                                                                                                            | –0.4 | –0.6                     | –1.5                     | V     |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$                 | Gate Threshold Voltage Temperature Coefficient        | I <sub>D</sub> = –250 μA, Referenced to 25°C                                                                                                                                                                                            |      | 2                        |                          | mV/°C |
| R <sub>DS(on)</sub>                                    | Static Drain–Source On–Resistance                     | V <sub>GS</sub> = –4.5 V, I <sub>D</sub> = –0.7 A<br>V <sub>GS</sub> = –2.5 V, I <sub>D</sub> = –0.5 A<br>V <sub>GS</sub> = –1.8 V, I <sub>D</sub> = –0.4 A<br>V <sub>GS</sub> = –4.5 V, I <sub>D</sub> = –0.7 A, T <sub>J</sub> =125°C |      | 221<br>297<br>427<br>250 | 270<br>360<br>650<br>348 | mΩ    |
| I <sub>D(on)</sub>                                     | On–State Drain Current                                | V <sub>GS</sub> = –4.5 V, V <sub>DS</sub> = –5 V                                                                                                                                                                                        | –1.8 |                          |                          | A     |
| g <sub>FS</sub>                                        | Forward Transconductance                              | V <sub>DS</sub> = –5 V, I <sub>D</sub> = –0.7 A                                                                                                                                                                                         |      | 2.5                      |                          | S     |
| Dynamic Characteristics                                |                                                       |                                                                                                                                                                                                                                         |      |                          |                          |       |
| C <sub>iss</sub>                                       | Input Capacitance                                     | V <sub>DS</sub> = –6 V, V <sub>GS</sub> = 0 V,                                                                                                                                                                                          |      | 146                      |                          | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                    | f = 1.0 MHz                                                                                                                                                                                                                             |      | 60                       |                          | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                          |                                                                                                                                                                                                                                         |      | 48                       |                          | pF    |
| Switching Characteristics (Note 2)                     |                                                       |                                                                                                                                                                                                                                         |      |                          |                          |       |
| t <sub>d(on)</sub>                                     | Turn–On Delay Time                                    | V <sub>DD</sub> = –6 V, I <sub>D</sub> = 1 A,<br>V <sub>GS</sub> = –4.5 V, R <sub>GEN</sub> = 6 Ω                                                                                                                                       |      | 5                        | 10                       | ns    |
| t <sub>r</sub>                                         | Turn–On Rise Time                                     |                                                                                                                                                                                                                                         |      | 13                       | 23                       | ns    |
| t <sub>d(off)</sub>                                    | Turn–Off Delay Time                                   |                                                                                                                                                                                                                                         |      | 8                        | 16                       | ns    |
| t <sub>f</sub>                                         | Turn–Off Fall Time                                    |                                                                                                                                                                                                                                         |      | 2                        | 4                        | ns    |
| Q <sub>g</sub>                                         | Total Gate Charge                                     | V <sub>DS</sub> = –6 V, I <sub>D</sub> = –0.7 A,<br>V <sub>GS</sub> = –4.5 V                                                                                                                                                            |      | 1.7                      | 2.4                      | nC    |
| Q <sub>gs</sub>                                        | Gate–Source Charge                                    |                                                                                                                                                                                                                                         |      | 0.3                      |                          | nC    |
| Q <sub>gd</sub>                                        | Gate–Drain Charge                                     |                                                                                                                                                                                                                                         |      | 0.4                      |                          | nC    |
| Drain–Source Diode Characteristics and Maximum Ratings |                                                       |                                                                                                                                                                                                                                         |      |                          |                          |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain–Source Diode Forward Current |                                                                                                                                                                                                                                         |      |                          | –0.25                    | A     |
| V <sub>SD</sub>                                        | Drain–Source Diode Forward Voltage                    | V <sub>GS</sub> = 0 V, I <sub>S</sub> = –0.25 A (Note 2)                                                                                                                                                                                |      | –0.7                     | –1.2                     | V     |

**Notes:**

1.  $R_{\theta JA}$  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  $R_{\theta JA}$  is determined by the user's board design.  $R_{\theta JA} = 415^\circ\text{C/W}$  when mounted on a minimum pad of FR-4 PCB on still air environment

2. Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2.0%

## Typical Characteristics

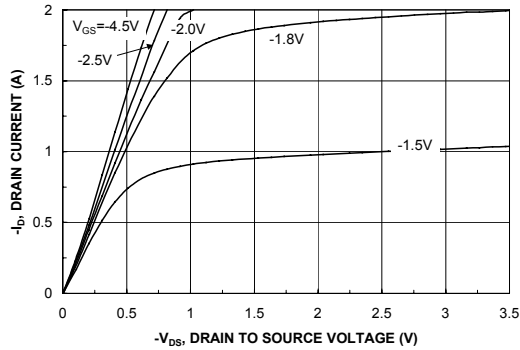


Figure 1. On-Region Characteristics.

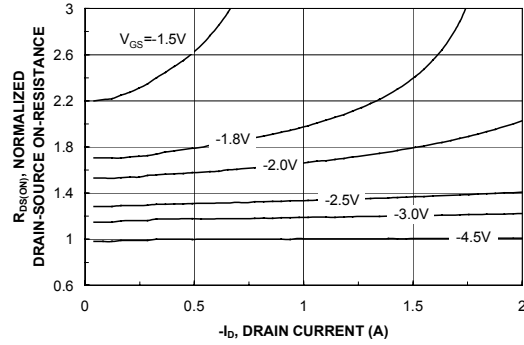


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

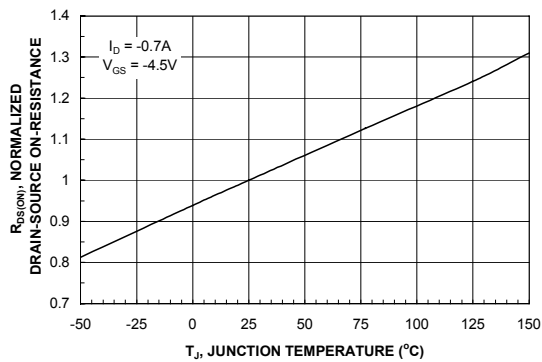


Figure 3. On-Resistance Variation with Temperature.

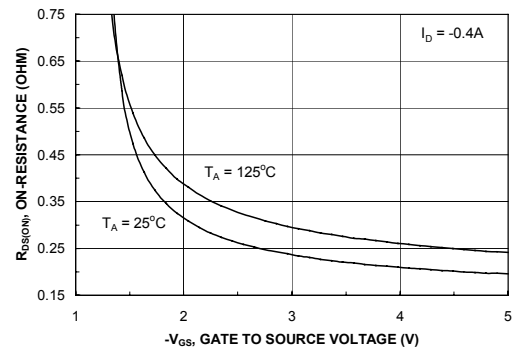


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

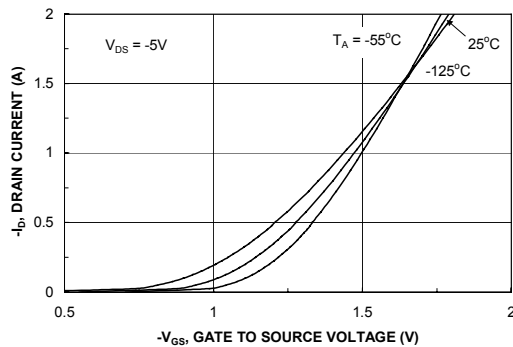


Figure 5. Transfer Characteristics.

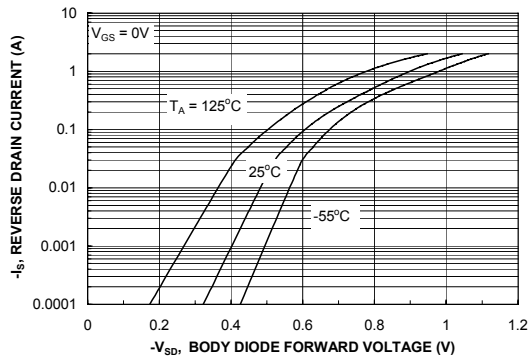


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

## Typical Characteristics

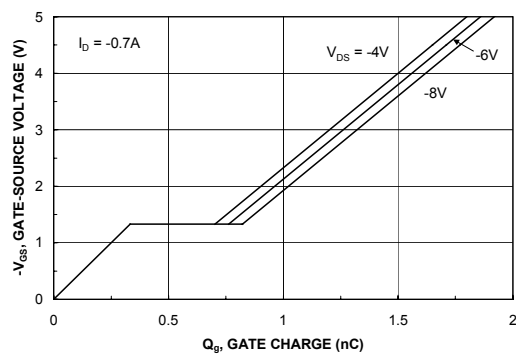


Figure 7. Gate Charge Characteristics.

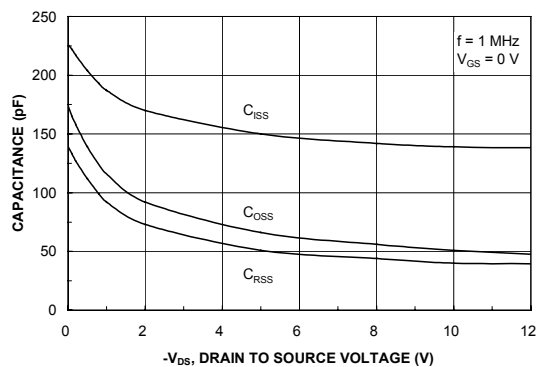


Figure 8. Capacitance Characteristics.

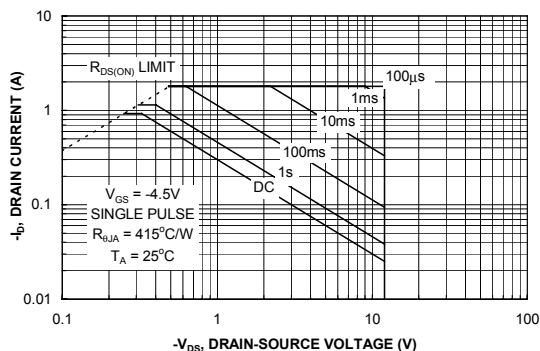


Figure 9. Maximum Safe Operating Area.

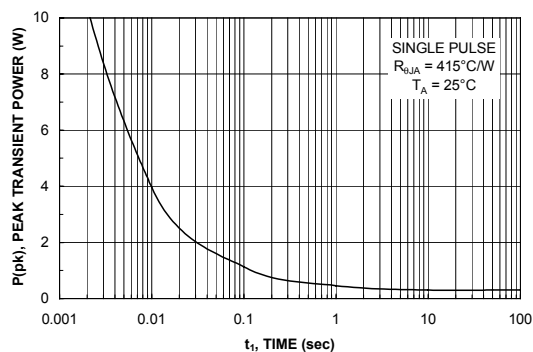


Figure 10. Single Pulse Maximum Power Dissipation.

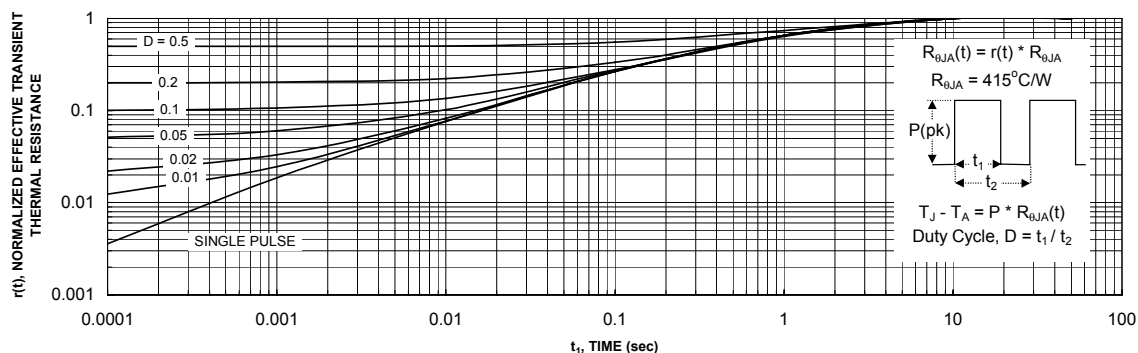


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1.  
Transient thermal response will change depending on the circuit board design.

## 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.

|                                   |                                  |                                  |                              |                   |
|-----------------------------------|----------------------------------|----------------------------------|------------------------------|-------------------|
| ACE <sup>Ex</sup> <sup>TM</sup>   | FAST <sup>®</sup>                | OPTOLOGIC <sup>TM</sup>          | SMART START <sup>TM</sup>    | VCX <sup>TM</sup> |
| Bottomless <sup>TM</sup>          | FAST <sup>r</sup> <sup>TM</sup>  | OPTOPLANAR <sup>TM</sup>         | STAR*POWER <sup>TM</sup>     |                   |
| CoolFET <sup>TM</sup>             | FRFET <sup>TM</sup>              | PACMAN <sup>TM</sup>             | Stealth <sup>TM</sup>        |                   |
| CROSSVOLT <sup>TM</sup>           | GlobalOptoisolator <sup>TM</sup> | POP <sup>TM</sup>                | SuperSOT <sup>TM</sup> -3    |                   |
| DenseTrench <sup>TM</sup>         | GTO <sup>TM</sup>                | Power247 <sup>TM</sup>           | SuperSOT <sup>TM</sup> -6    |                   |
| DOME <sup>TM</sup>                | HiSeC <sup>TM</sup>              | PowerTrench <sup>®</sup>         | SuperSOT <sup>TM</sup> -8    |                   |
| EcoSPARK <sup>TM</sup>            | ISOPLANAR <sup>TM</sup>          | QFET <sup>TM</sup>               | SyncFET <sup>TM</sup>        |                   |
| E <sup>2</sup> CMOS <sup>TM</sup> | LittleFET <sup>TM</sup>          | QS <sup>TM</sup>                 | TinyLogic <sup>TM</sup>      |                   |
| EnSigna <sup>TM</sup>             | MicroFET <sup>TM</sup>           | QT Optoelectronics <sup>TM</sup> | TruTranslation <sup>TM</sup> |                   |
| FACT <sup>TM</sup>                | MicroPak <sup>TM</sup>           | Quiet Series <sup>TM</sup>       | UHC <sup>TM</sup>            |                   |
| FACT Quiet Series <sup>TM</sup>   | MICROWIRE <sup>TM</sup>          | SILENT SWITCHER <sup>®</sup>     | UltraFET <sup>®</sup>        |                   |

STAR\*POWER is used under license

## 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

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 user.
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.                                                   |

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А