



## N-Channel 60-V (D-S) 175°C MOSFET

## PRODUCT SUMMARY

| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A)       |
|-------------------|---------------------------|-----------------|
| 60                | 0.0049 @ $V_{GS} = 10$ V  | 90 <sup>a</sup> |
|                   | 0.0055 @ $V_{GS} = 4.5$ V |                 |

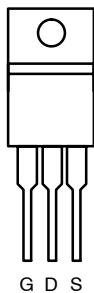
## FEATURES

- TrenchFET® Power MOSFET
- 175°C Maximum Junction Temperature

## APPLICATIONS

- Automotive Such As
  - High-Side Switch
  - Motor Drives
  - 12-V Battery
- Synchronous Rectification

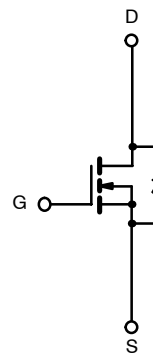
TO-220AB



Top View

DRAIN connected to TAB

Ordering Information: SUP90N06-05L—E3



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

| Parameter                                              |                           | Symbol         | Limit            | Unit             |
|--------------------------------------------------------|---------------------------|----------------|------------------|------------------|
| Drain-Source Voltage                                   |                           | $V_{DS}$       | 60               | V                |
| Gate-Source Voltage                                    |                           | $V_{GS}$       | $\pm 20$         |                  |
| Continuous Drain Current ( $T_J = 175^\circ\text{C}$ ) | $T_C = 25^\circ\text{C}$  | $I_D$          | 90 <sup>a</sup>  | A                |
|                                                        | $T_C = 125^\circ\text{C}$ |                | 90 <sup>a</sup>  |                  |
| Pulsed Drain Current                                   |                           | $I_{DM}$       | 240              |                  |
| Avalanche Current, Single Pulse                        |                           | $I_{AS}$       | 75               |                  |
| Repetitive Avalanche Energy, Single Pulse              | $L = 0.1$ mH              | $E_{AS}$       | 280              | mJ               |
| Maximum Power Dissipation                              | $T_C = 25^\circ\text{C}$  | $P_D$          | 300 <sup>b</sup> | W                |
| Operating Junction and Storage Temperature Range       |                           | $T_J, T_{stg}$ | -55 to 175       | $^\circ\text{C}$ |

## THERMAL RESISTANCE RATINGS

| Parameter                      | Symbol     | Limit | Unit               |
|--------------------------------|------------|-------|--------------------|
| Junction-to-Ambient (Free Air) | $R_{thJA}$ | 62.5  | $^\circ\text{C/W}$ |
| Junction-to-Case               | $R_{thJC}$ | 0.5   |                    |

## Notes

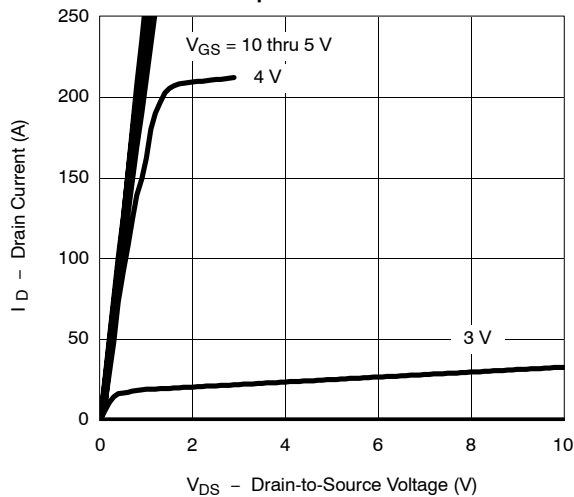
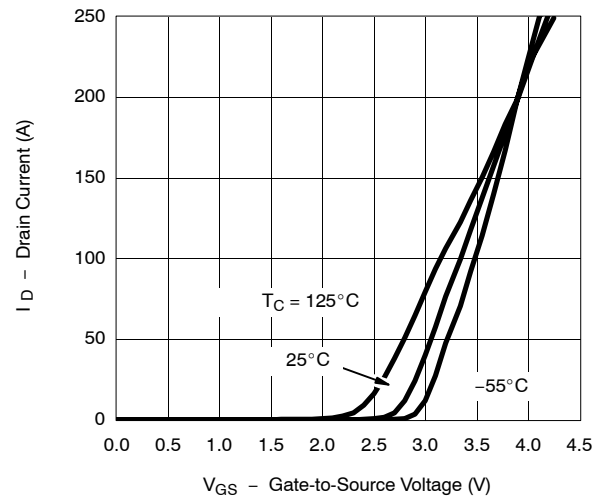
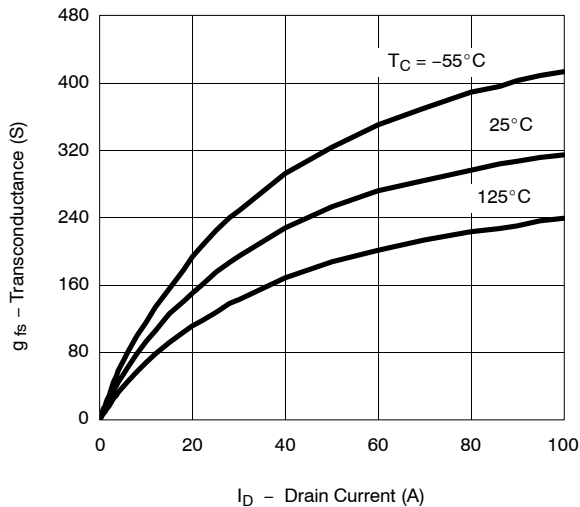
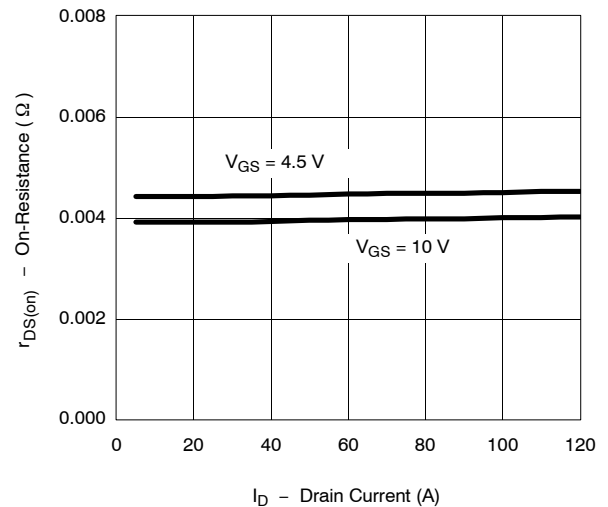
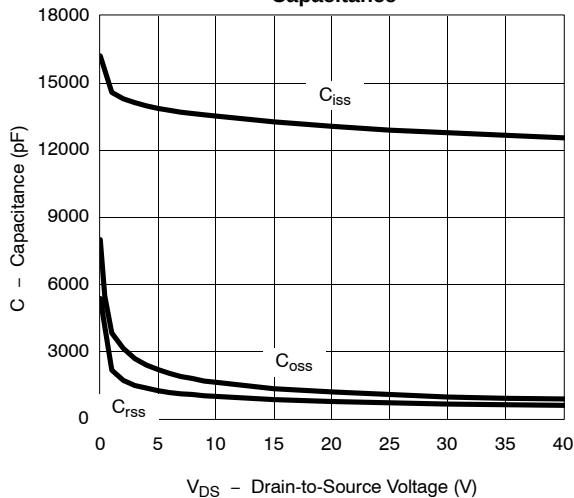
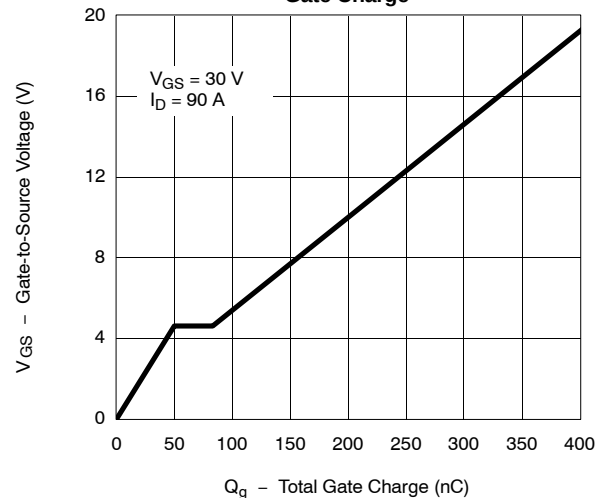
- a. Package limited.  
b. See SOA curve for voltage derating.

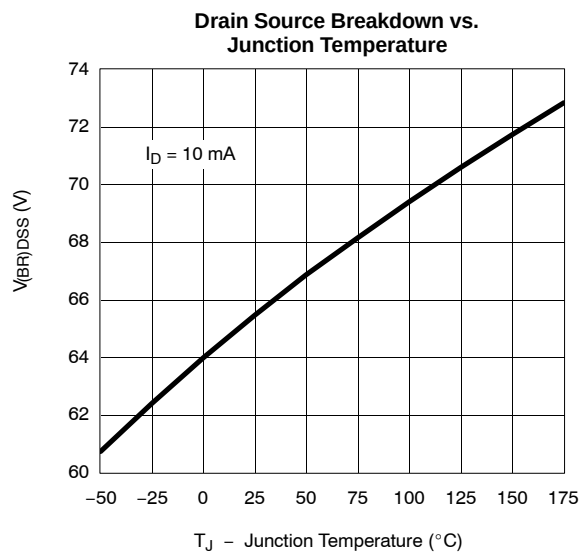
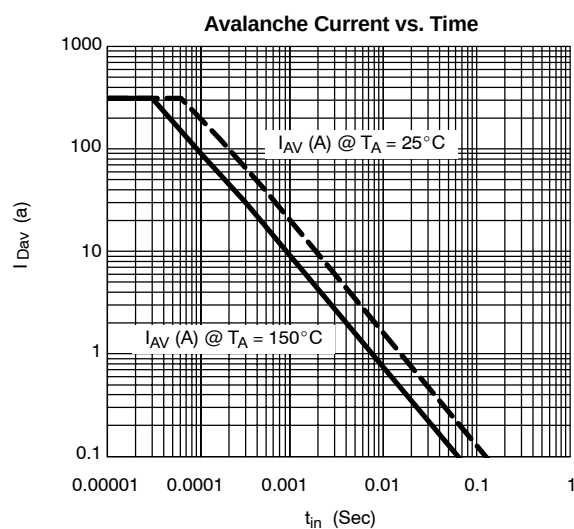
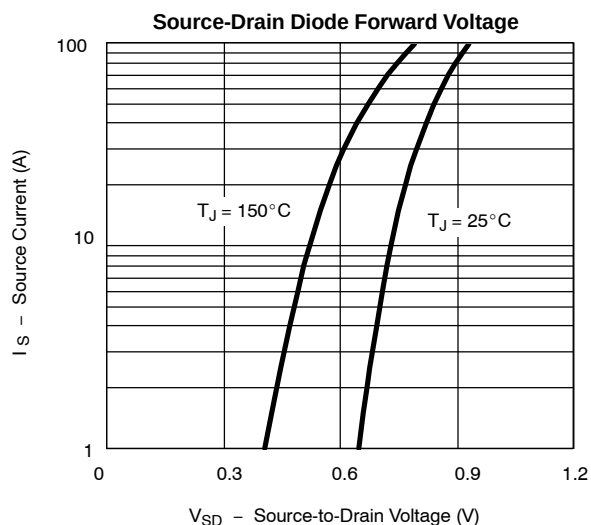
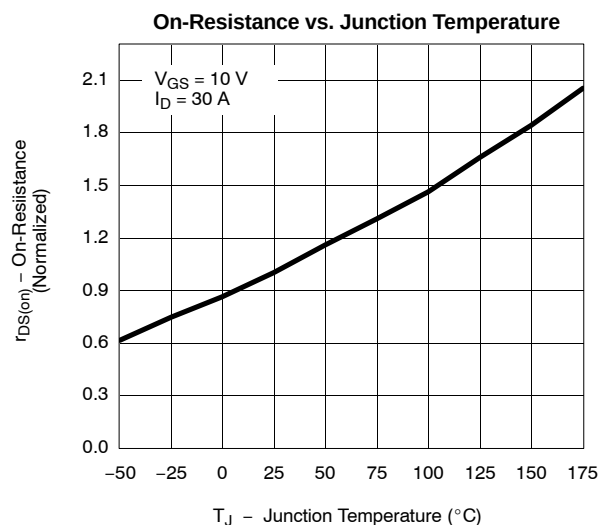
**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

| Parameter                                                                           | Symbol               | Test Condition                                                                                                            | Min | Typ    | Max    | Unit |
|-------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------|-----|--------|--------|------|
| Static                                                                              |                      |                                                                                                                           |     |        |        |      |
| Drain-Source Breakdown Voltage                                                      | V <sub>(BR)DSS</sub> | V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA                                                                            | 60  |        |        | V    |
| Gate-Threshold Voltage                                                              | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                                               | 1   |        | 3      |      |
| Gate-Body Leakage                                                                   | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V                                                                            |     |        | ± 100  | nA   |
| Zero Gate Voltage Drain Current                                                     | I <sub>DSS</sub>     | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V                                                                             |     |        | 1      | μA   |
|                                                                                     |                      | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125°C                                                     |     |        | 50     |      |
|                                                                                     |                      | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175°C                                                     |     |        | 250    |      |
| On-State Drain Current <sup>a</sup>                                                 | I <sub>D(on)</sub>   | V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V                                                                             | 120 |        |        | A    |
| Drain-Source On-State Resistance <sup>a</sup>                                       | r <sub>DS(on)</sub>  | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A                                                                             |     | 0.0039 | 0.0049 | Ω    |
|                                                                                     |                      | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A                                                                            |     | 0.0044 | 0.0055 |      |
|                                                                                     |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125°C                                                     |     |        | 0.0083 |      |
|                                                                                     |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175°C                                                     |     |        | 0.0103 |      |
| Forward Transconductance <sup>a</sup>                                               | g <sub>fs</sub>      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A                                                                             | 30  |        |        | S    |
| Dynamic <sup>b</sup>                                                                |                      |                                                                                                                           |     |        |        |      |
| Input Capacitance                                                                   | C <sub>iss</sub>     | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz                                                                  |     | 12900  |        | pF   |
| Output Capacitance                                                                  | C <sub>oss</sub>     |                                                                                                                           |     | 1060   |        |      |
| Reverse Transfer Capacitance                                                        | C <sub>rss</sub>     |                                                                                                                           |     | 700    |        |      |
| Gate Resistance                                                                     | R <sub>g</sub>       | f = 1.0 MHz                                                                                                               |     | 1.3    |        | Ω    |
| Total Gate Charge <sup>c</sup>                                                      | Q <sub>g</sub>       | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 90 A                                                     |     | 200    | 300    | nC   |
| Gate-Source Charge <sup>c</sup>                                                     | Q <sub>gs</sub>      |                                                                                                                           |     | 50     |        |      |
| Gate-Drain Charge <sup>c</sup>                                                      | Q <sub>gd</sub>      |                                                                                                                           |     | 33     |        |      |
| Turn-On Delay Time <sup>c</sup>                                                     | t <sub>d(on)</sub>   | V <sub>DD</sub> = 30 V, R <sub>L</sub> = 0.33 Ω<br>I <sub>D</sub> ≅ 90 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω |     | 22     | 35     | ns   |
| Rise Time <sup>c</sup>                                                              | t <sub>r</sub>       |                                                                                                                           |     | 130    | 200    |      |
| Turn-Off Delay Time <sup>c</sup>                                                    | t <sub>d(off)</sub>  |                                                                                                                           |     | 110    | 165    |      |
| Fall Time <sup>c</sup>                                                              | t <sub>f</sub>       |                                                                                                                           |     | 280    | 420    |      |
| Source-Drain Diode Ratings and Characteristics (T <sub>C</sub> = 25°C) <sup>b</sup> |                      |                                                                                                                           |     |        |        |      |
| Continuous Current                                                                  | I <sub>S</sub>       |                                                                                                                           |     |        | 90     | A    |
| Pulsed Current                                                                      | I <sub>SM</sub>      |                                                                                                                           |     |        | 240    |      |
| Forward Voltage <sup>a</sup>                                                        | V <sub>SD</sub>      | I <sub>F</sub> = 90 A, V <sub>GS</sub> = 0 V                                                                              |     | 1.1    | 1.5    | V    |
| Reverse Recovery Time                                                               | t <sub>rr</sub>      | I <sub>F</sub> = 90 A, di/dt = 100 A/μs                                                                                   |     | 55     | 82     | ns   |
| Peak Reverse Recovery Current                                                       | I <sub>RM(REC)</sub> |                                                                                                                           |     | 3.6    | 5.4    | A    |
| Reverse Recovery Charge                                                             | Q <sub>rr</sub>      |                                                                                                                           |     | 0.1    | 0.22   | μC   |

## Notes

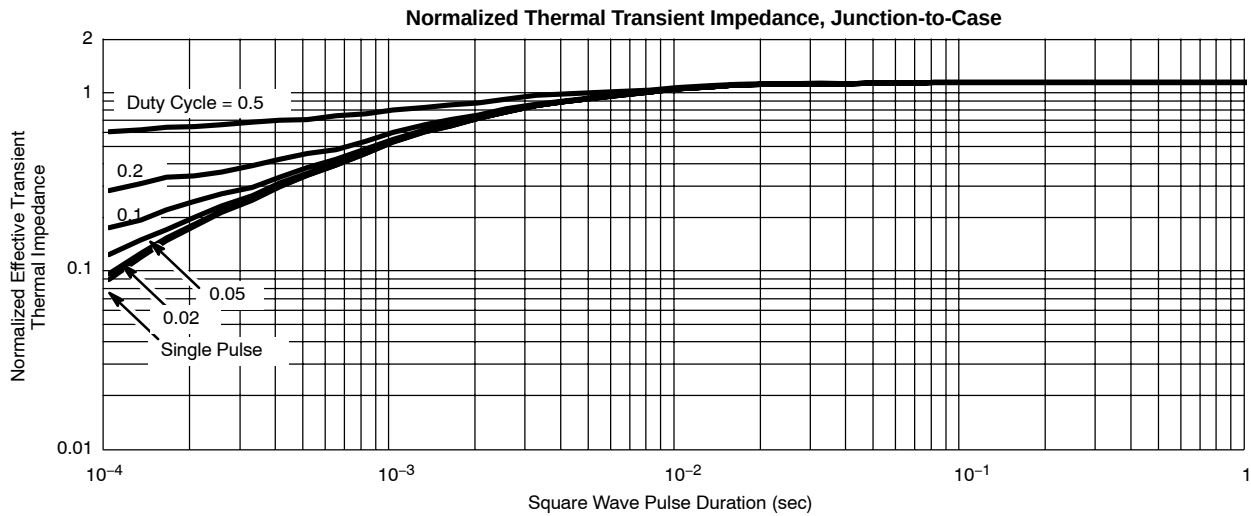
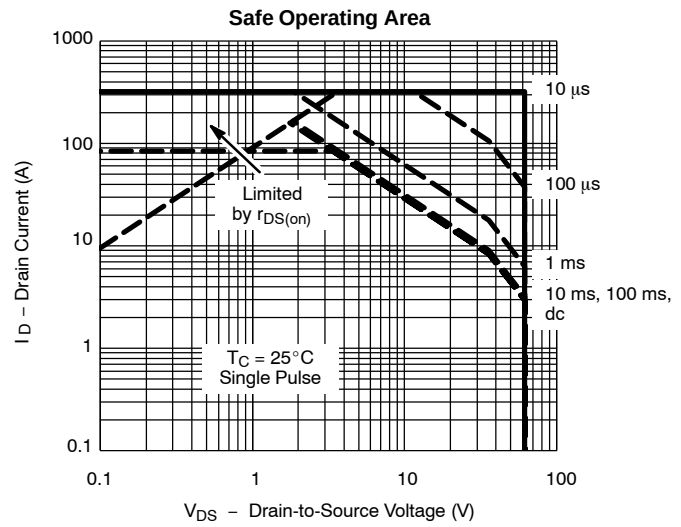
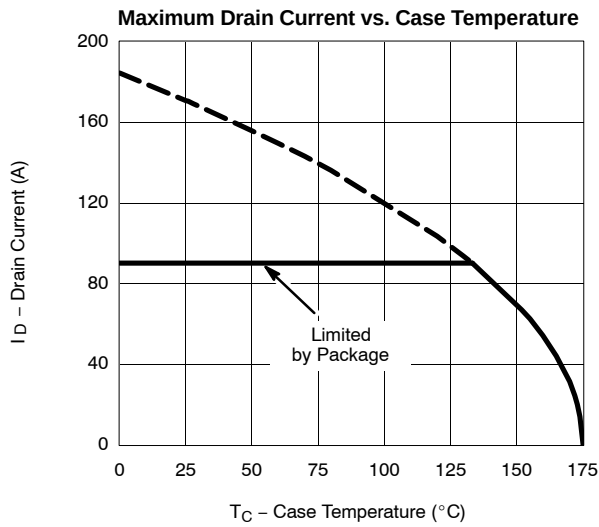
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.  
b. Guaranteed by design, not subject to production testing.  
c. Independent of operating temperature.

**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)****Output Characteristics****Transfer Characteristics****Transconductance****On-Resistance vs. Drain Current****Capacitance****Gate Charge**

**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**



**THERMAL RATINGS**





### Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.

## 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](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9