

AT90-1283

Digital Attenuator
15.5 dB, 5-Bit, TTL Driver, DC-3.5 GHz

Rev. V11

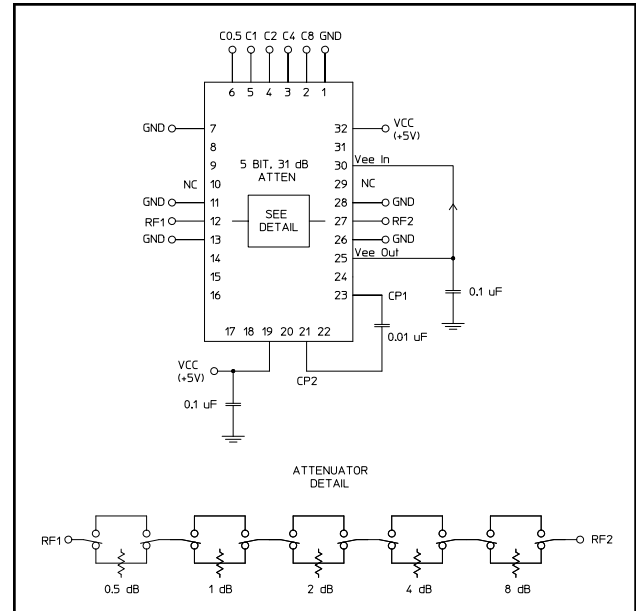
Features

- Attenuation: 0.5 dB Steps to 15.5 dB
- Single Positive Supply
- Contains Internal DC to DC Converter
- Low DC Power Consumption
- Small Footprint, JEDEC Package
- Integral TTL Driver
- 50 ohm Impedance
- CSP-1 Package

Description

M/A-COM's AT90-1283 is a GaAs FET 5-bit digital attenuator with integral TTL driver. Step size is 0.5 dB providing a 15.5 dB total attenuation range. This device is in an PQFN plastic surface mount package. The AT90-1283 is ideally suited for use where accuracy, fast speed, very low power consumption and low costs are required. For dual supply designs without switching noise, use AT90-0283.

Schematic with Off-Chip Components



Pin Configuration³

| Pin No. | Function | Pin No. | Function |
|---------|-----------------|---------|------------------------------|
| 1 | GND | 17 | NC |
| 2 | C8 | 18 | NC |
| 3 | C4 | 19 | Vcc |
| 4 | C2 | 20 | NC |
| 5 | C1 | 21 | Cp |
| 6 | C0.5 | 22 | NC |
| 7 | GND | 23 | Cp |
| 8 | NC | 24 | NC |
| 9 | NC | 25 | V _{EE} ² |
| 10 | NC ¹ | 26 | GND |
| 11 | GND | 27 | RF2 |
| 12 | RF1 | 28 | GND |
| 13 | GND | 29 | NC ¹ |
| 14 | NC | 30 | V _{EE} ² |
| 15 | NC | 31 | NC |
| 16 | NC | 32 | Vcc |

1. Pins 10 and 29 must be isolated.
2. V_{EE} is produced internally and requires a .1 μ F cap to GND. Generated noise is typical of switching DC-DC Converters.
3. The exposed pad centered on the package bottom must be connected to RF and DC ground. (For PQFN Packages)

Ordering Information

| Part Number | Package |
|--------------|-------------------|
| AT90-1283 | Bulk Packaging |
| AT90-1283TR | 1000 piece reel |
| AT90-1283-TB | Sample Test Board |

Note: Reference Application Note M513 for reel size information.

ADVANCED: Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
PRELIMINARY: Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.4155721 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.

Electrical Specifications: $T_A = +25^\circ\text{C}$

| Parameter | Test Conditions | Frequency | Units | Min | Typ | Max |
|---|--|--|--------------------|-------------|-------------|---|
| Insertion Loss | — | DC - 3.5 GHz | dB | — | 2.8 | 3.2 |
| Attenuation Accuracy | Individual Bits 0.5-1-4-8 dB Individual Bit 2 dB Any Combination of Bits 1 to 15.5 dB | DC - 3.5 GHz DC - 3.5 GHz DC - 3.5 GHz | dB dB dB | — — — | — — — | $\pm(3 +5\%$ of atten setting) $\pm(4 +10\%$ of atten setting) $\pm(5 +7\%$ of atten setting) |
| VSWR | Full Range | DC - 3.5 GHz | Ratio | — | 1.6:1 | 1.8:1 |
| Switching Speed | 50% Cntl to 90%/10% RF 10% to 90% or 90% to 10% | — — | ns ns | — — | 75 20 | 150 50 |
| 1 dB Compression | — — | 50 MHz 0.5 - 3.5 GHz | dBm dBm | — — | +21 +29 | — — |
| Input IP_3 | Two-tone inputs up to +5 dBm | 50 MHz 0.5-3.5 GHz | dB dB | — — | +35 +48 | — — |
| V_{CC} | — | — | V | 4.75 | 5.0 | 5.25 |
| V_{IL} V_{IH} | LOW-level input voltage HIGH-level input voltage | — — | V V | 0.0 2.0 | — — | 0.8 5.0 |
| I_{in} (Input Leakage Current) | $V_{in} = V_{CC}$ or GND | — | μA | -1.0 | — | 1.0 |
| I_{CC}^4 | V_{CC} min to max, Logic "0" or "1" | — | mA | — | 6 | 10 |
| Turn-on Current ⁵ | For guaranteed start-up | — | mA | — | — | 125 |
| ΔI_{CC} (Additional Supply Current Per TTL Input Pin) | $V_{CC} = \text{Max}$, $V_{cntrl} = V_{CC} - 2.1 \text{ V}$ | — | mA | — | — | 1.0 |
| Switching Noise | Generated from DC-DC Converter with recommended capacitors | 3.5 MHz | dBm | — | -93 | — |
| Thermal Resistance θ_{jc} | — | — | $^\circ\text{C/W}$ | — | 15 | — |

- During turn-on, the device requires an initial start up current (I_{CC}) specified as "Turn-on Current". Once operational, I_{CC} will drop to the specified levels.
- The DC-DC converter is guaranteed to start in 100 μs as long as the power supplies have the maximum turn-on current available for start-up.

Absolute Maximum Ratings^{6,7}

| Parameter | Absolute Maximum |
|---|--|
| Max. Input Power 0.05 GHz 0.5 - 3.5 GHz | +27 dBm +34 dBm |
| V_{CC} | $-0.5\text{V} \leq V_{CC} \leq +6.0\text{V}$ |
| V_{in}^8 | $-0.5\text{V} \leq V_{in} \leq V_{CC} + 0.5\text{V}$ |
| Operating Temperature | -40°C to $+85^\circ\text{C}$ |
| Storage Temperature | -65°C to $+125^\circ\text{C}$ |

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM does not recommend sustained operation near these survivability limits.
- Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

Handling Procedures

Please observe the following precautions to avoid damage:

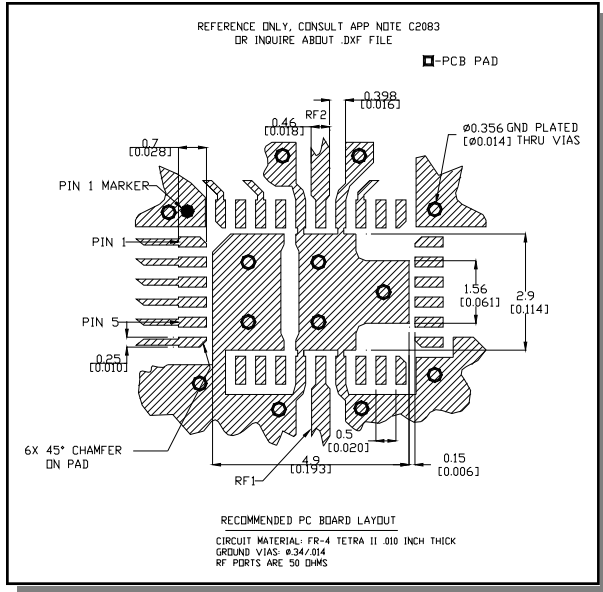
Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Moisture Sensitivity

The MSL rating for this part is defined as Level 2 per IPC/JEDEC J-STD-020. Parts shall be stored and/or baked as required for MSL Level 2 parts.

Recommended PCB Configuration⁹



9. Application Note C2083 is available on line at www.macom.com

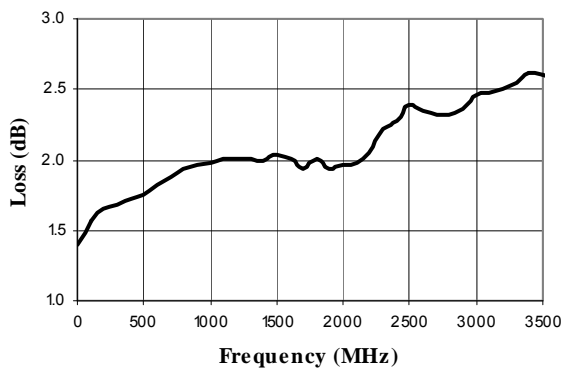
Truth Table (Digital Attenuator)

| C8 | C4 | C2 | C1 | C0.5 | Attenuation |
|----|----|----|----|------|-----------------|
| 0 | 0 | 0 | 0 | 0 | Loss, Reference |
| 0 | 0 | 0 | 0 | 1 | 0.5 dB |
| 0 | 0 | 0 | 1 | 0 | 1.0 dB |
| 0 | 0 | 1 | 0 | 0 | 2.0 dB |
| 0 | 1 | 0 | 0 | 0 | 4.0 dB |
| 1 | 0 | 0 | 0 | 0 | 8.0 dB |
| 1 | 1 | 1 | 1 | 1 | 15.5 dB |

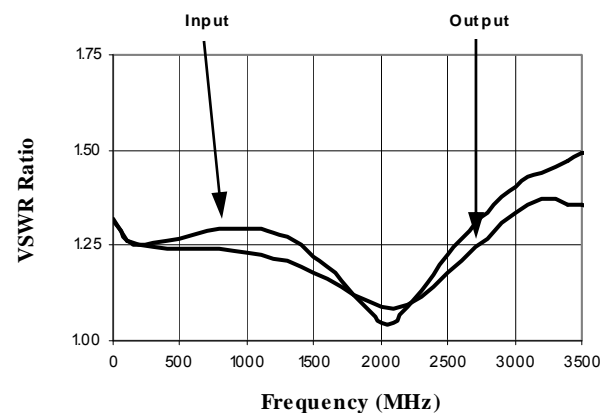
0 = TTL Low; 1 = TTL High

Typical Performance Curves

Insertion Loss

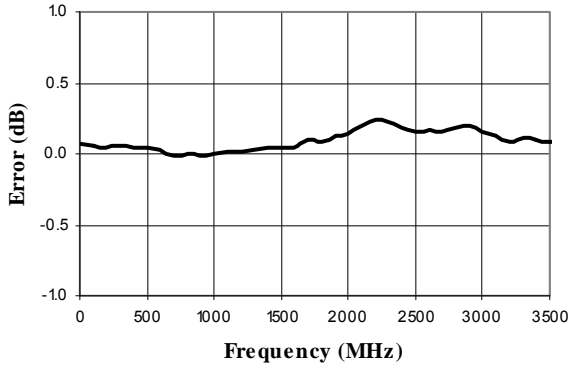


VSWR @ Insertion Loss

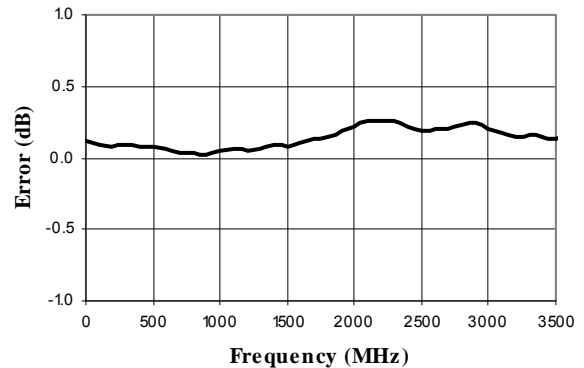


Typical Performance Curves

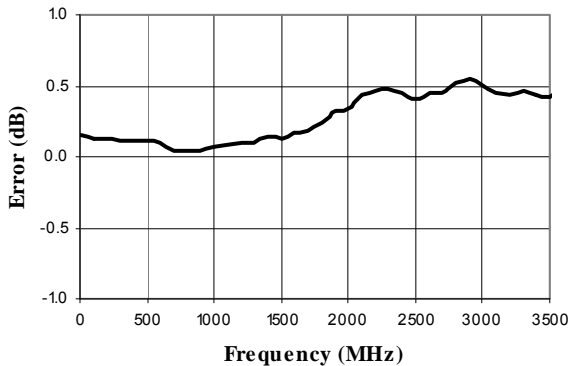
Attenuation Error, 0.5 dB Bit



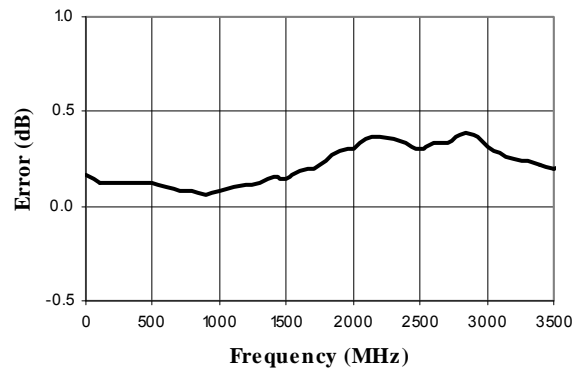
Attenuation Error, 1 dB Bit



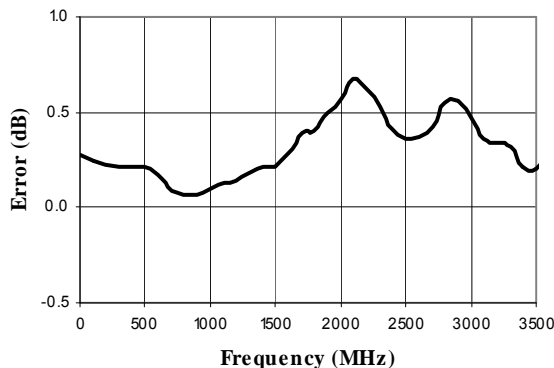
Attenuation Error, 2 dB Bit



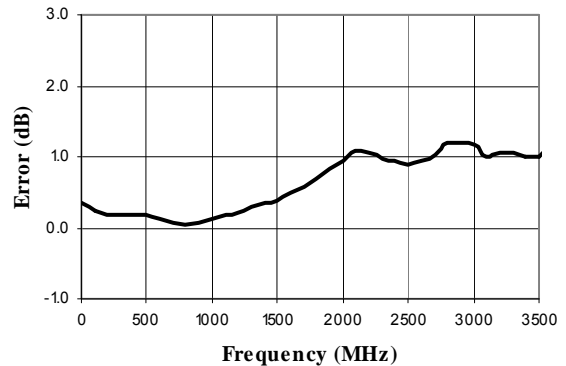
Attenuation Error, 4 dB Bit



Attenuation Error, 8 dB Bit

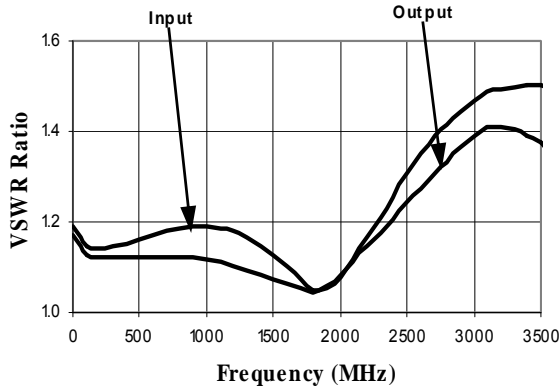


Attenuation Error, Max. Attenuation

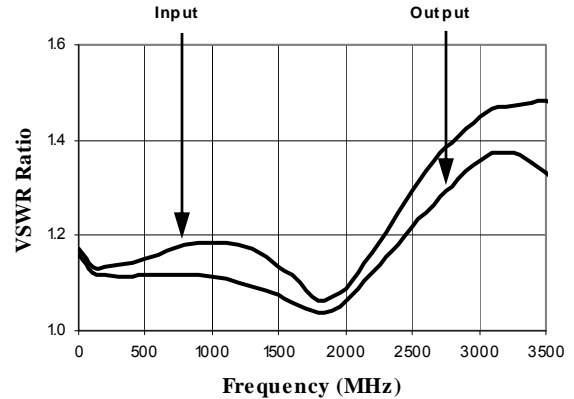


Typical Performance Curves

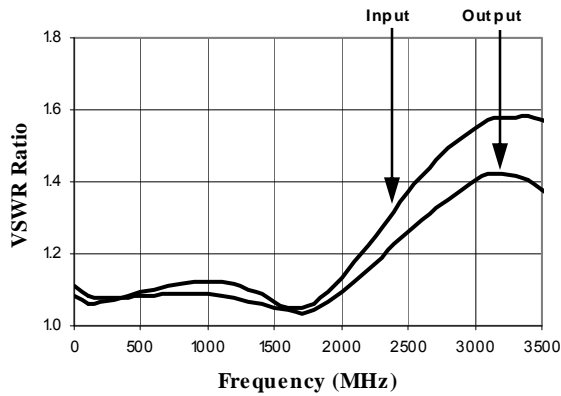
VSWR, 0.5 dB Bit



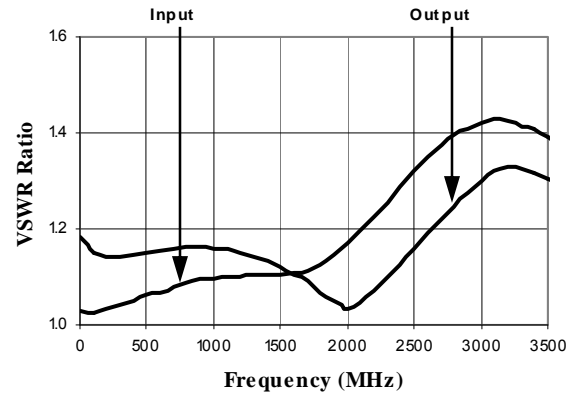
VSWR, 1 dB Bit



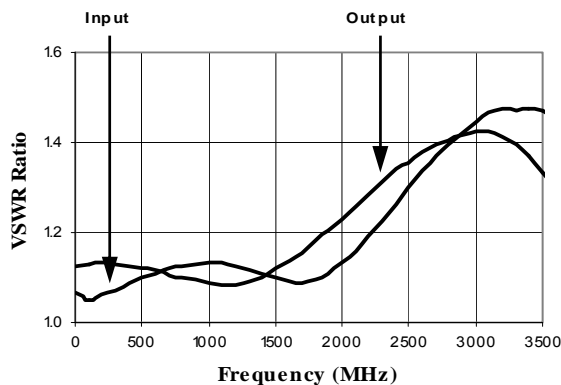
VSWR, 2 dB Bit



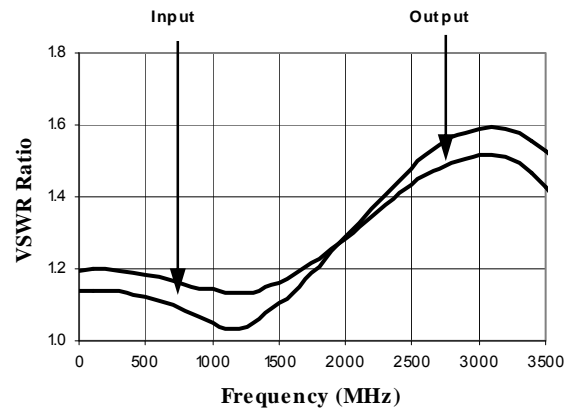
VSWR, 4 dB Bit



VSWR, 8 dB Bit



VSWR, Maximum Attenuation

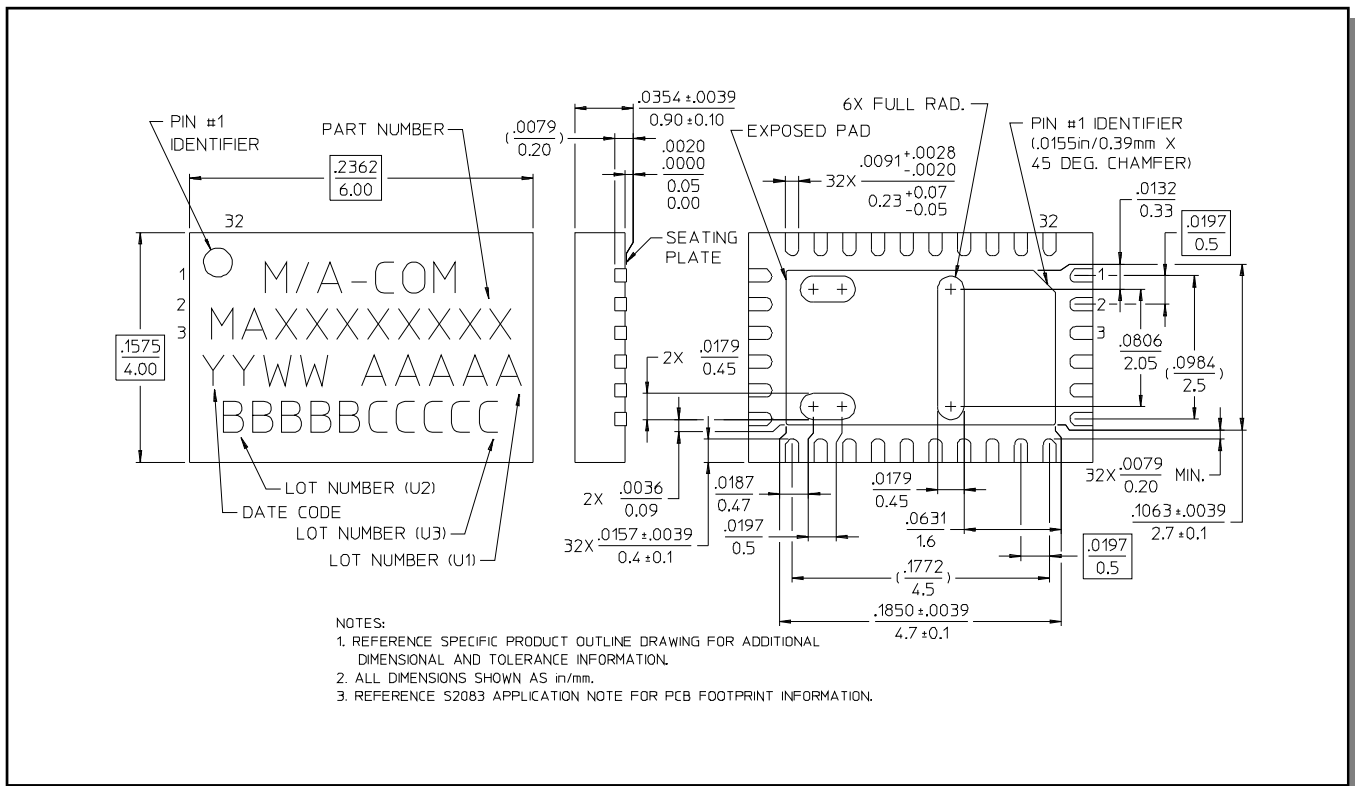


AT90-1283

Digital Attenuator
15.5 dB, 5-Bit, TTL Driver, DC-3.5 GHz

Rev. V11

CSP-1, 4 x 6 mm, 32-lead PQFN†



† Reference Application Note M538 for lead-free solder reflow recommendations.

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_4

moschip.ru_6

moschip.ru_9